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CONDUITS FOR WATER.

BY GEO. J. HENRY.

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BY JOHN A. BRITTON.

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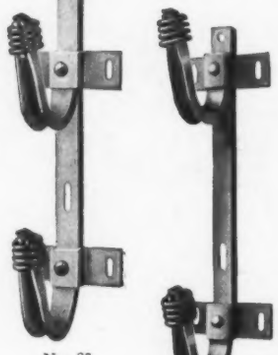

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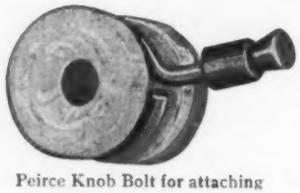

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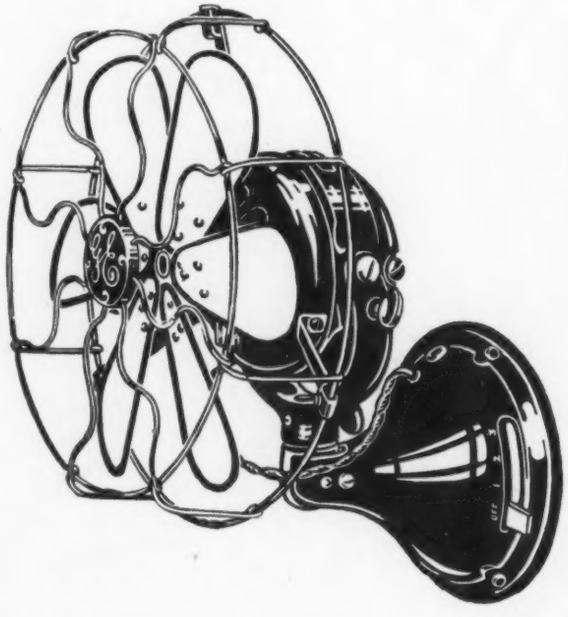

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CONDUITS FOR WATER

BY GEO. J. HENRY.

High Pressure Lapwelded Steel Pipe Line of No. 1 Plant, Pacific Light & Power Company of Los Angeles at Big Creek. There Are Two Plants Each of 30,000 k.w. Capacity and Operating Under 2160 ft. and 1980 ft. Head Respectively.

From the time of the early Romans we find that man has conveyed water in pipes. These were at first very expensive, of small size and unreliable; the most frequent method employed was therefore by "aqueducts." These were usually very elaborate engineering works and occur today as some of the most interesting ruins of the past. They are to be found all over Southern Europe and to some extent on the American Continent. A fine example but recently displaced was that for conveying water from the springs at Chapultepec to the City of Mexico. Passages cut in the native stone were extensively used by the Moors in Spain and were a decided factor in making Moorish Spain a land of golden plenty.

Aside from a few isolated examples of metal pipes in early Greece and Rome in which bronze and copper and in at least one case silver pipes were used, wood seems to have been most extensively employed for the purpose. They were of an extremely crude character, little or no attention being paid to resistance to internal pressure and to resistance to flow.

By referring to Formulae (1) (Journal of Electricity, Power and Gas, May 25, 1912, p. 494) $V = \sqrt{2gh}$, we have the velocity of a body falling free-

ly. If instead of falling freely it is resisted by friction in any way we may write $V = \sqrt{2gh\mu}$ or $h = \frac{V^2}{2g\mu}$ (37) where μ is the resistance. If a mass of water be falling in a vertical pipe, Fig. 34, we may represent the relative velocities at any cross section by the arrows and the quantity that will pass any cross section and therefore the quantity that will be discharged by the pipe will be less than if the same water cross section was falling freely. This is due to the relative velocity, of the first particles, to the sides, and the first layer particles retard those next to them and so in a series of increasing velocities the consecutive layers approach the center at which maximum velocity may be obtained. Also any roughness in the

Fig. 34.

Fig. 35.

Fig. 36.

Fig. 37.

pipe surface (Fig. 35) will greatly increase the retardation due to eddy currents being set up as will also bends (Fig. 36) especially if these be, as frequently in practice, sharp angled (Fig. 37). Centrifugal force is also quite a factor in disturbing the smooth flow within the bend increasing of course with higher velocities of flow.

As the interior or contact surface is responsible for a retardation it is obvious that the larger the ratio

$$\frac{\text{cross section area of flow}}{\text{Wet perimeter or boundary}} \quad \ldots\ldots (38)$$

the less retardation and therefore the smaller the loss in forcing a given Q through the pipe or conduit. For a given area of cross section the circle has the least perimeter and we see at once a circular section is more efficient as regards friction loss than any other; and as it is also the best shape to resist internal pressure we find it almost universally used for pipes. Semi-circular steel and wood stave flumes are also coming into use quite extensively, merely as water carriers where no pressure is involved. In the case of an open conduit there is also a surface of retardation—the wetted perimeter and also the surface exposed to the air, which is retarded due to the relative velocity of the water and air. As would be expected there is a higher velocity to be found below the surface. If there be a wind from the direction in which the water flows the retardation will be greater and if with the direction of flow it will be less. This may seem like a small factor, but if the canal or flume be of great length it is one that by no means can be neglected, as for example, the "Los Angeles Aqueduct" across the Mojave desert where the prevailing winds are against the direction of water flow.

In taking water from a stream a point is usually chosen where the velocity is quite low and in such cases to acquire the velocity necessary in the canal or flume an entrance head or fall must be allowed for introducing the necessary acceleration. The value of this is at once found from the velocity formula above (37) for a velocity

V = 1 ft/sec.	h = .0156 ft.
2 "	1. "
3 "	1.26 "
4 "	1.56 "
5 "	.062 "
6 "	.14 "
7 "	.25 "
8 "	.39 "
9 "	.56 "
10 "	.76 "

and whenever a change in cross section occurs in any conduit there must be an inverse change in velocity for any given Q, and therefore there must be an allowance for velocity head + when the velocity increases and — when it decreases.

In flumes laid with a very small slope and at the entrance to tunnels and at sharp radius bends a careful consideration must be given to the velocity head to avoid a constriction of the flow or an overflowing of the sides. In the case of open flumes or canals, especially if long and in dry countries and on sunny hill sides, evaporation as well as leakage and seepage may become important factors as also the collection and safe discharge of storm waters that may enter at various points; for which spillways must be provided of excess capacity and sand boxes or traps with discharge outlets arranged at convenient points.

The transporting power of a current will be as the sixth power of the velocity (J. N. Le Conte—Elements of Geology) and water flowing 5 ft. per second will carry with it a piece of granite weighing about four pounds, at 1 ft. velocity one weighing only about 2 grains and at ½ ft. velocity about .03 grain. A sand box to be effective should therefore be arranged so as to allow the water to slow up to ½ ft. per second or less and long enough for this reduced rate of flow to continue until the particles have settled or "dropped through" the mass of moving water to the bottom.

The material of the sides and bottom of a ditch will of course vary in different localities and no higher velocity is permissible than that which will be safely resisted by the cohesion of such material. No safe rule of allowable velocities in earth or sand can be given. Careful intelligent observation based on experiment with the actual material is the only reliable guide. Usually, however, sand will stand at 1 ft. and clay at from 5 to 6 ft. per second and with a very good cement lining velocities of ten feet may be reached while with poor cement erosion will occur at five feet or even less. In some cases the settling out of transported matter requires an extremely slow velocity and in the case of one Western power plant employing a wooden flume over ten miles long, glacial sand is brought down in such quantities by the river and through the flume into a large forebay reservoir that a dredge has been kept in this reservoir a large part of the time to keep it from filling up with the silt which will not separate at any apparent velocity.

A surface of wood either as a flume or pipe allows a high velocity of flow and therefore a much smaller structure for conveying a given quantity than the usual ditch. A wood stave pipe offers decided advantages as a water conduit in place of a ditch; by far the greatest being the avoidance of the necessity of an even grade. In mountainous districts such a pipe may be carried up hill and down dale conforming to the easiest route, limited only by the hydraulic mean gradient and by the strength to resist pressure. High pressures should not be employed. Precautions must of course be taken in anchoring and in protection against freezing, preferably by burying the pipe and by at all times maintaining a velocity in the pipe. Stand pipes and air valves must be provided as on any other pipe line. Storm waters can not get in with their detritus; spillways are unnecessary, and evaporation and seepage are reduced to a minimum.

If a shorter route has been obtained even with the higher velocity probably used there will in most cases be less actual head lost than in the case of an open but longer ditch. One other great advantage frequently to be obtained by the use of pipe conduits is that where a dam is provided at the inlet from the river the pipe may be taken from the bottom but the pressure due to the depth of water behind the dam is not sacrificed but may be transferred to the pressure pipe or may be partially used if desired to increase the rate of flow during periods of maximum water supply. Sudden changes of velocity are to be avoided and an adherence to this rule is more important in the case of concrete and wood stave pipes than where steel (a more elastic material) is used.

To convey a given quantity of water (**Q**) through a pipe (**P**) with an actual difference in elevation **A** will result in a loss at entry to establish the increase in velocity **P**, a loss in the pipe due to friction on the sides and eddy currents, and at the nozzle due again to changes in velocity. If the total of these losses be placed equal to (**f**) we will have an effective pressure at the outlet of $H - f = h$, which resulting head produces the spouting velocity $v = \sqrt{2gh}$. As pointed out (**f**) is made up of several losses and the hydraulic mean grade is not necessarily a straight line. In the case of an open conduit the hydraulic mean grade is the surface of the water. In the case of a closed pipe it is that line which is the locus of the points to which water would rise vertically above the pipe due to the pressure. In the case of pipes used for water conduits only, as is usually the case in city water works, the entire head is used to force a quantity of water without reference to retaining any of the energy therein and in such cases the hydraulic mean grade line commences at the inlet water surface and terminates at the outlet water surface. In the case of a pipe line however for the development of power from the falling of water the water energy is to be conserved for transformation to mechanical or electrical power instead of being expended to force the greatest quantity through the pipe.

One of the best known formula and approximately correct for obtaining the velocity of flow in water conduits is that of Chezy, $V = C\sqrt{sr}$ ..... (39) where **C** is a factor depending on roughness, **r** is the hydraulic mean radius (38) and **s** the slope. The velocity and therefore the quantity carried by a given pipe would vary as $\sqrt{s}$. In the case of a pipe for power development $s = f$ and we may say that **Q** is proportional to $\sqrt{f}$. The water quantity **Q** flowing in a given pipe line may then be represented by a curve of square roots where (Fig. 38) the ordinates are the effective heads $(H - f) = h$ and the abscissas are the resulting water quantities. For the purposes of demonstration the values are given on each line, and Table VII is given to make clear the calculation by which the curve of efficiency output is obtained. This curve indicates the theoretical energy contained in the discharged water based on different sized outlets being used with their corresponding resulting losses in the pipe taken into account.

The area of the inscribed rectangle **D E B C** will be a measure of the energy in the water.

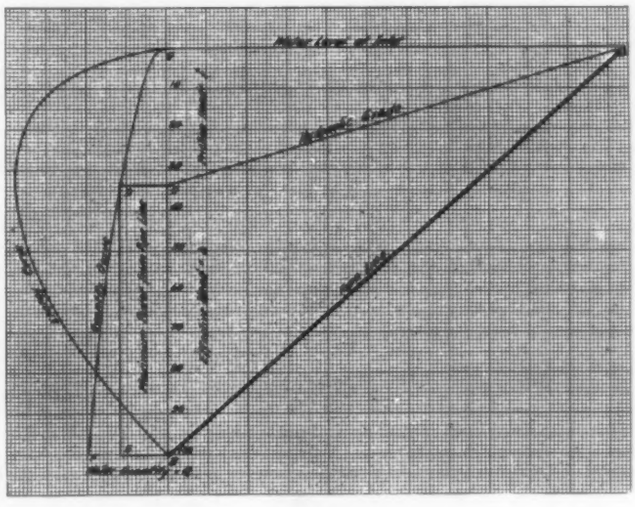


Fig. 38.

If the friction loss $f = GC$ the effective head $= BC = h$ the water quantity $BE = Q$; the total head $GB = H$. It will then be seen that when **h** is max. **C** coincides with **G** and $EB = Q = O$.

When **Q** is max. **E** coincides with **F** and $BC = O$ and $GC = GB = f$. Now the energy is proportional to the area **BCDE** and this area is greatest when $GC =$

$\frac{CB}{2}$ or the greatest energy is obtained when 1/3 of the head is expended in friction. This is however very seldom the most economical point at which to work the pipe line. To sacrifice 1/3 of the energy recoverable from any water fall for the purpose of a slight saving in the first cost of the pipe is a grave error. For example, if a pipe line would cost $10,000 delivered at the power site and develop 10,000 h.p. with 33.3 per cent loss, it would be better to design the pipe for only 5 per cent loss and we may then obtain $10,000 + 28.3$ per cent or 2830 h.p. additional by the extra expense of a larger pipe. It is obvious

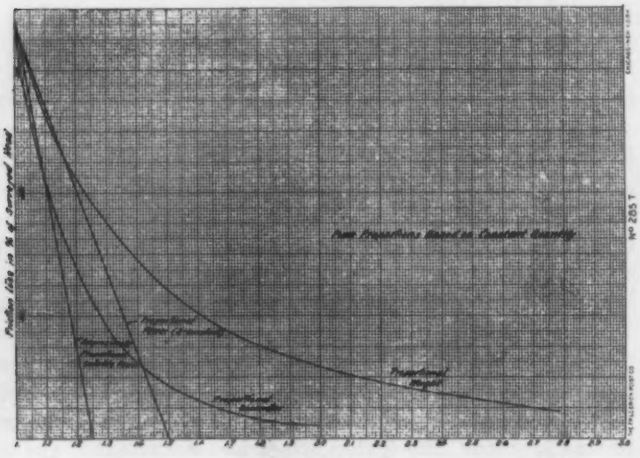


Fig. 39.

that to avail ourselves of this and with the same Q (5.77 in the above table) we must now have a friction loss of 5, or to put it in another way we must with a slope or friction loss of 5 be able to force $Q = 5.77$ through the new pipe where a $10,000 pipe would carry $Q = 5.77$ on a slope of 33.3.

From formula (39) $v = C\sqrt{sr}$ it is seen that in the first case $\frac{v}{C\sqrt{r}} = \sqrt{s} = \sqrt{33.3}$ and $v \backsim \frac{1}{d^2}$ and we may for approximate comparison assume C to be constant then for the same quantity of water.

$$\frac{\text{Const}}{d^2} = \sqrt{r}\sqrt{s} \text{ and } \frac{\text{Const}}{d_1^2} = \sqrt{r_1}\sqrt{s_1} \ldots\ldots\ldots\ldots (40)$$

and $d^2 \times \sqrt{r} \times \sqrt{33.3} = d_1^2 \times \sqrt{r_1} \times \sqrt{s_1}$. But $r = \frac{\pi d^2}{4d}$

$$\therefore d^{5/2}\sqrt{33.3} = d_1^{5/2}\sqrt{s_1} \text{ and } \frac{d^{5/2}}{d_1^{5/2}} = \frac{\sqrt{s_1}}{\sqrt{33.3}} \ldots\ldots\ldots (41)$$

$$\text{or } \frac{d^5}{d_1^5} = \frac{5}{33.3} = \frac{1}{6.63} \text{ and } d^5\sqrt{6.63} = 1.46d = d_1.$$

The weight of the new pipe will be increased in proportion to the diameter and to the thickness but the thickness $\backsim$ as the diameter hence the weight and (therefore very closely the cost) varies as the (diameter)^2 hence our new pipe will weigh and cost 1.46^2 or about two times as much. That is $10,000 additional gives 2666 h.p. more power available; an excellent investment in most cases.

If the first line were to cost $30,000, then by doubling this investment we could obtain 2666 h.p. additional from the pipe or at the rate of about $11.30 per h.p., which is still a most excellent investment. The additional cost of hydraulic and electric apparatus must be added to this to determine the entire additional cost but when this is done if the amount is less than the investment for power under the high friction loss then it is certainly economy to adopt the larger pipe line. These formulae and figures are only approximately correct and the example is here introduced only to show the importance of the friction loss in determining the investment warranted in the pipe. On account of the variation in cost of different sizes and thicknesses of material, due largely to factory conditions, transportation and raw material, each case must be carefully figured. A proper rate of interest and amortization must of course be charged against the increased investment just as against the balance of the capital invested in the plant. The general rule may be stated as follows: If the cost of all the hydraulic and electrical machinery and other expenses involved from the outlet of the pipe to the user that vary as the units of power that may be marketed (Foundations, buildings, crane, roads, pipe installation, canals or flumes and usually transmission lines and operating and maintenance costs may usually be eliminated from this item) are added to the increased pipe cost per unit of increased power obtained, and this does not exceed the entire cost per unit of power based on using the greater friction loss then such additional investment to reduce the friction in the pipe is justifiable. With this rule in mind and the use of the formula (40) which presupposes a definite water quantity available, we may get a very close approximation of the most economical pipe to use in any given case and to facilitate such calculations Table VII is given and the corresponding curves are shown in Fig. 39.

Table VII.

Effective Head. H — f = h.	Head Lost. f	Proportional water quantity discharged Q.	Energy remaining proportional to Q × h.
100 = H	0	0	0
90	10	3.161	284.49
80	20	4.472	357.76
70	30	5.477	382.39
66.66	33.33	5.77	384.62
60	40	6.325	379.50
50	50	7.071	353.55
40	60	7.746	309.84
30	70	8.366	247.98
20	80	8.944	178.88
10	90	9.487	94.87
0	100	10.	0.

Taking the maximum power output of a pipe in terms of the head we would have for a given Q the following relationship where $h = 100$.

If $f = 33.3$ = maximum power output $d = 1$ $w = 1$, then the proportional power output from the pipe is given in Table VIII.

In most cases judgment will readily determine the approximate economical loss to allow and the calculation of the pipe on this basis will at once give a starting point by which a close final value may be obtained from the curves in Fig 39.

Example.

Assume 20 cu. ft. per second is the flow available = Q, that the pipe is to be 4000 ft. long and the head 500 ft. Using riveted pipe and allowing for aging we will have a friction loss of about 20 ft. per 1000 in 20 in. pipe or a total f = 80. Assume the cost per unit of other apparatus = $50 per horsepower and that the power has a sale value of $40 per year—allow 10 per cent for fixed charges and 10 per cent for investment, then $20 per year capitalized or ($400 less 20 per cent, less $50)—$270 would be the value of each horsepower gained by reducing pipe friction.

The above 20 in. pipe would cost about $7000 f.o.b. Pacific Coast Terminal at present rates. From the curves it is seen that (80 being 16 per cent of 500) the diameter is as 1.16 is to 1.46 (5 per cent loss) for a pipe which will weigh $\frac{2.13}{1.34} = 1.6$ and proportionate cost $11,200 (25 in. mean dia.)

The saleable power will be about 50 per cent of the theoretical power (Journal of Electricity, Power and Gas, March 30, 1912, p. 288) and this would be about as $\frac{1.26}{1.43} = 13$ per cent increase in saleable power for the expenditure of $11,200 — $7,000, or $4,200. Under 420 ft. effective head 20 sec. ft. of water corresponds with 950 h.p. theoretical or 475 h.p saleable and 13 per cent increase would be 62 h.p. additional to sell, for $4200 increased investment in the pipe or at the rate of $68 per horsepower.

The comparative cost of the two pipes would be $\frac{7000}{950} = \$7.40$ and $\frac{11200}{1073.0}$ $10.40 respectively per theoretical horsepower.

If to obtain the same head the pipe would have to be 8000 ft. long, then a 20 in. pipe conveying 20 sec. ft. would have a friction loss of 166 ft. (or 1/3 the head) the power output would be 755 h.p. theoretical, and cost $14,000, and a pipe to give only 5 per cent loss would have to be 1.46×20 or 29½ in. dia. and the cost of the raw material would be 2.13 or $30,000. In this case the cost of 1073 — 755 = 318 additional horsepower would be $30{,}000 - 14{,}000 - \frac{16{,}000}{318.} =$ over $50 per theoretical horsepower for the pipe alone and combined with the increase in the other apparatus would run the cost to considerably over $100 per h.p. and while there are many cases where this is justifiable there are many others where it is not. For example it may be that dams, roads, transmission lines and other expensive fixtures have been necessary for the initial development and by them water is impounded in excess of the market for power for many years and that after the initial development additional power can be developed for $45 per h.p.—in such a case it would be economical to increase the 4000 ft. pipe to suitable dimensions for 5 per cent loss, but it would certainly not be economy to increase the 8000 ft. pipe to the 5 per cent loss although it probably would be wise to increase it to obtain only about 8 per cent loss. This would not apply with equal force where future additions contemplated additional pipe lines.

Table VIII.

Effective head. H—f=h.	Friction lost in per cent of surveyed head.	Proportional diam. of pipe = d.	Proportional weight of pipe = w.	Proportional power output from pipe. Q = Const.
100	0			1.500
99	1	2.	4.	1.485
98	2	1.669	2.78	1.470
97	3	1.603	2.57	1.465
96	4	1.528	2.34	1.440
95	5	1.460	2.13	1.425
94	6	1.415	2.	1.410
93	7	1.365	1.86	1.395
92	8	1.330	1.77	1.380
91	9	1.291	1.67	1.365
90	10	1.261	1.58	1.350
88	12	1.227	1.5	1.320
86	14	1.189	1.41	1.290
84	16	1.158	1.34	1.260
82	18	1.131	1.28	1.230
80	20	1.106	1.22	1.200
75	25	1.059	1.12	1.125
66.67	33.33	1.	1.	1.

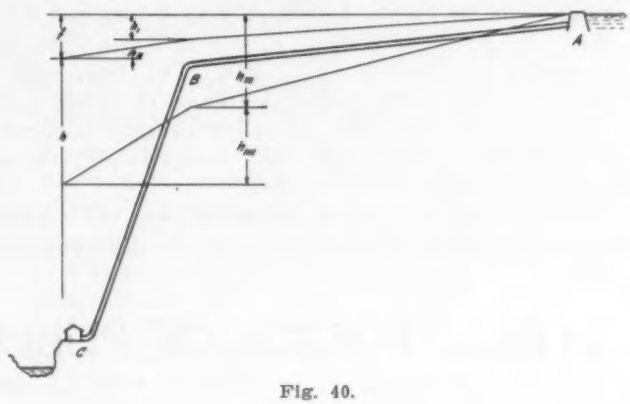


Fig. 40.

It is obvious from a study of the Chezy formula (39) that the slope s or friction head (a less confusing term where pipes are calculated for water power) increases as a function of the velocity V or quantity Q, and therefore that as the gates or nozzles are changed at the power house to vary the water quantity issuing

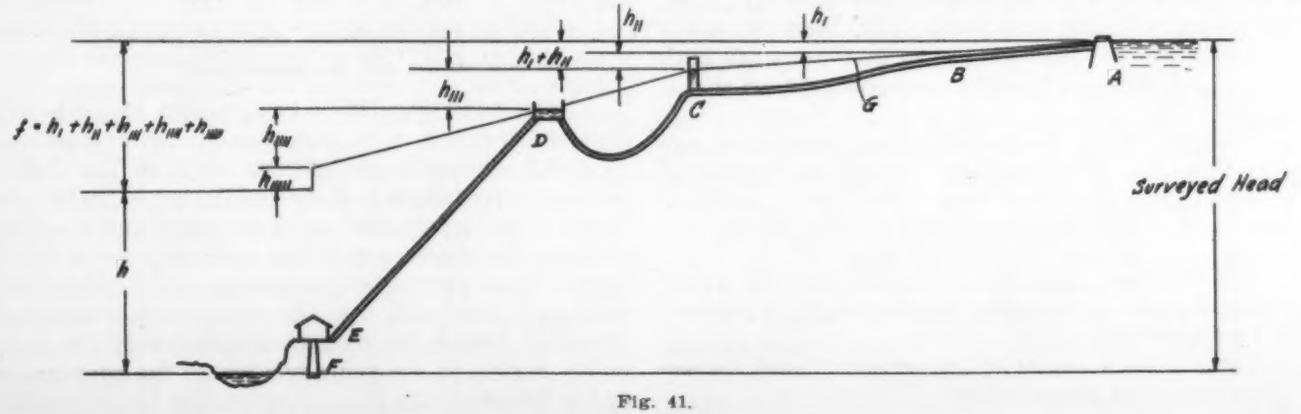


Fig. 41.

from the pipe that the friction loss varies. The hydraulic grade therefore varies as a function of the water quantity and is level when the gates are closed ($V = O$) and is drawn down to 1/3 of the head for maximum power (Fig. 38) and down to the nozzle for max. Q and Energy = O.

In the case of an open flume the hydraulic grade is the surface of the water. In the case of a closed conduit emptying below water into a reservoir it is a line from the surface of the water at the inlet to the surface of the water at the outlet.

Take the case of a compound conduit as shown in Fig. 40 where a dam is shown at A from which point the water is conveyed in a flume or ditch to the point B with loss = h_i here the construction becomes more expensive due to the broken character of the country and a wooden pipe is used.

From B to C this is carried up and down to suit the profile of the ground, keeping always below the hydraulic grade G. This pipe terminates in a stand pipe C and the friction loss is h_{ii} from C to the reservoir D is an inverted syphon with a loss h_{iii} from which the pressure pipe D. E. conveys the water to the power house with a loss h_{iii}. The draft tube f discharges under the surface water of the river with a friction loss of h_{iiii} and from our original surveyed head we must subtract the total losses $f = h_i + h_{ii} + h_{iii} + h_{iiii} + h_{iiii}$ or $H - f = h$.

The flume, the tunnel, the wood pipe, the syphon and the pressure pipe will all represent different unit costs and their most economical sections and therefore slopes or friction heads may and probably will all be different. If practical it may be better to substitute a stand pipe for reservoir D as then when conveying less water (i.e. less friction loss) the effective head h will be increased.

If at any point the conduit projects above the hydraulic grade line, the flow will be retarded until a quantity is flowing that corresponds with an hydraulic grade line passing through that point, a steeper line beyond this point will by draft or suction be equivalent to increasing the head and will "draw" water over the high point (within the limits of vacuum) causing a negative or collapsing pressure.

In the case shown in Fig. 41 h_i = friction of pipe AB; h_{ii} = friction of pipe BC. If the pipe has been calculated for a friction loss $f = h_i + h_{ii}$ and the demand at the power house is increased (due to a break in the pipe or careless operating conditions) so that the hydraulic grade becomes $h_{iii} + h_{iiii}$. A negative pressure K, frequently, sufficient to collapse the pipe is caused. For this reason a stand pipe, reservoir or an air valve must be located at the point B or at every part where a sudden change to an increased slope occurs.

(The foregoing is one of a series of articles on Elements of Hydraulic Engineering, each complete in itself, appearing from time to time in this Journal. They are copyrighted and all rights reserved by the author, Geo. J. Henry, consulting engineer, Rialto Building, San Francisco.)

PUBLIC POLICY OF PUBLIC UTILITY CORPORATIONS

BY JOHN A BRITTON.

(In this article the author emphasizes the importance of the individual employe in the carrying out of a successful public policy and states the basis on which that policy should be formulated. The article was first presented as a paper before a recent meeting of the San Francisco Section A. I. E. E. The discussion is also valuable and will appear in the next issue.—The Editors.)

The subject of my address this evening is an hackneyed one, upon which volumes have been written and many theories advanced since ever corporations were.

Unfortunately, no two minds have ever agreed as to the question of the public or policy, and I am apprehensive that I will but add one more to the many diverse views, and that when I pronounce the benediction, you will be no farther advanced in your opinion, and may only have another theory to place in the dusty pigeon holes of your memory.

Practice and theory are at the ends of two widely separated lines; sometimes if either one or the other becomes elastic they may touch each other, and it has been my purpose through life to at times grab both lines and force them together, satisfying myself that it can be done.

Practically at the present time corporations are not allowed to have any well canned and preserved policy of their own, they must follow those made for them, and this is best illustrated perhaps by the following excerpt from a Pittsburg paper:

The office boy, responding to a visitor's call, had the following interview, as illustrating the activities of the personnel of a public utility:

"Where's the president of this company?" asked the man who called at the general office.

"He's down in Washington attendin' th' session o' some kind uv an investigatin' committee," replied the office boy.

"Where is the general manager?"

"He's appearin' before th' railroad commission."

"Well, where's the general superintendent?"

"He's at th' meetin' of th' legislature, fightin' some new bum law."

"Where is the head of the legal department?"

"He's in court, tryin' a suit."

"Then where is the commercial agent?"

"He's explainin' t' th' supervisors why we can't reduce the rates."

"Who's running the blame company, anyway?"

"The newspapers and the legislatures."

Now, while regulation has brought about a very different and, it may be said, a vastly better condition of things generally as between most of the Public Service Corporations and the public served, it has not deprived these corporations of the right and privilege of promulgating lines of policy, but rather has it forced upon the corporations the necessity of laying down hard and fast rules, that the public may understand with full knowledge that each member of the body politic stands in the same relation to the corporation as his fellow.

Public policy, as the phrase is understood, means the moral attitude of a corporation towards those with whom it comes into contact, and is generally measured by the mental length, breadth and thickness of each particular person contacted. It means, as a rule, pursuing the path of least resistance, a recognition to the ninth power of the other fellow's rights, without losing your own self-respect, a subordination of personal preferences to general orders.

Public policy is not a term, however, that should be applied to utilities exclusively, for it is applicable to all forms of business having private or personal or public relations with the masses, such as any kind of trade from the itinerant peddler to the banker; your grocer and haberdasher; your bootblack or your wholesale merchant, and all of the relations should have the deep and full significance of true friendship, for of a right certainty, no business, no trade, and no commerce, as between people, or between nations, can flourish, and ultimately succeed, unless it is founded and fixed on the rocks of friendship and true fellowship.

There are classes of men who perhaps do not need this talismanic guide to true success, and they are those of the vagrant rich and the vagrant poor, both undeserving and both intolerable, and both aiding and abetting in the retardation of all true principles of business and business growth.

Now let us analyze the conditions that create or destroy the friendship of the masses and thereby create or destroy the policy of corporations, for it is of that class I am supposed to deal in my remarks tonight.

To my mind, the most important factor entering into the creation of a favorable policy, and perhaps in its final analysis an unfavorable one, is the question of personal equation—and by that term I mean the atmosphere that surrounds each individual in his or her attitude toward, and conception of, the problems that each are daily and hourly confronted with.

Most, if not all of you before me tonight are young men, just entering upon your separate spheres of activities as your early training, inclinations, or the fates have determined and directed. You are or should be unquestionably imbued with the sincerest of desires to make good in life, and to achieve your ambitions, for you would be less than men made of red blood and enduring fibre of bone and muscle did not have that ambition and faith in yourself, and you will then succeed in that particular line of life which you have determined, and reach the goal that your ambition has set as the ultimate mark of your success in life.

As reasonable thinking men, therefore, you must realize that alone you are helpless, that if you wanted to become an independent spirit, reckless of precedent, reckless of rules and customs, and reckless of the interests and feelings of your fellow men and women, you would soon become mere flotsam and jetsam on the world's swirling waters of business. You must, and I am sure do, thoroughly and sincerely realize the importance of so governing your lives and conduct in every day concerns that to assume any place of strong recognition in the marts of trade and commerce, you must be a close student of your fellow men, of his wants and desires, and above all must you realize that selfishness cannot in this world of progress become to be regarded as anything more than minuteness of intellect.

Assuming, therefore, that in the struggle for a position worth while in life, due consideration must be given to the desires and opinions of others, we reach a common plane from which we can coolly and dispassionately survey the situation and agree that beside ourselves there are others whose rights we must recognize and respect. Then perhaps will there be an approach to that millennium when the load factor and the power factor of human life will have reached unity.

This ability, through proper education of the personal equation, to recognize the rights of others, is the first step that leads eventually to a consummation of the ideal public policy.

It was the immortal Lincoln who said "You can fool a part of the people some of the time, all of the people a part of the time, but you can't fool all the people all of the time," and no matter how brilliant you may be in your schemes, no matter how many times you may put something over, mark me the day will come when these chickens will come home to roost, and golden eggs will become gilded ones.

A corporation, in its determination of a policy that will place it before the public in a favorable light, is dependent for such public favor and its continuance, not altogether upon the men in the mahogany chairs, but to a large degree upon such men as you, who daily come face to face with the public in all its moods and tenses, and while in a measure the men reflect the wishes of their leader, his wishes may be set aside by lack of that personal equation which I have before referred to. If a man arrives at his station the morning after, with a grouch (unfortunately some men do not require the night before to produce grouches, they carry them with them all of the time like an elephant's trunk), and such grouch is due to a disordered stomach, or a merry tango or tangled night, if therefore, you cannot smile without hurting your face or that of your neighbors, you are setting an example before that portion of the public which meets you, of a deficient interest in its behalf that is reflected as many times as the myriads of minute waves that are made by the pebble thrown into the center of the tranquil pool—the effect extends into infinity.

You are, by your daily conduct, establishing a reputation, not only for yourself, but your firm or corporation, that thousands of words and other efforts, promulgated from the office of the General Manager, cannot change or alter—be this reputation you establish for good or evil; how much better then to establish it for good, so as to create that public policy which is desired, for the poet well and truly says:

> "The purest treasure mortal times afford
> Is spotless reputation, that away
> Men are but gilded loam, or painted clay."

It is often said like master, like man, but that saying, in this age of wide diversity of activities of public utilities, coupled with the multiplicity of men engaged, is only partly true. Policies are seldom di-

rected by the governing head, they arise in the first instance from the rank and file.

All of that which I have heretofore said leads up to, but at the same time forms an integral part of my subject, and outlines the matters and things that are important and fundamental to the man in the conning tower as he views the fighting and firing lines, for he must feel helpless and hopeless, unless below him things are in shipshape, and team work is being pursued, from the stoker in the bilge hole to the captain on the bridge.

In seeking for the means whereby a proper public policy may be created, my mind has continually harkened back to the days of my youth, when corporations as they are now known were an unknown quantity, but when we were taught the simple lessons of peace and goodwill, and when in the absence of the disturbing factors of daily life now so prominent, these lessons took hold and held fast like hoops of steel. For in the formative period of fifty years ago, as compared to the present era, the world was primitive, transportation was limited in scope and capacity, the world was indeed vast, there were no telegraphs to girdle the earth, no telephones to minimize distance, no electric lights to make, mark and mar the great white ways, the flickering candle, sputtering oil lamps and very occasionally the gas jet, were our only artificial means of light and so in the absence of these diverting things of our twentieth century civilization, the mind had more time to ponder and reflect, and this with me remains, and has and will remain, that which I was taught in Sunday school, of my duty towards my neighbor, and it comes nearer today to being a perfect answer as to what should constitute the public policy of a corporation that I will quote it for your benefit:

"My duty towards my Neighbor is, to love him as myself, and to do to all men, as I would they should do unto me: To love, honor and succor my father and mother; To honor and obey the civil authority; To submit myself to all my governors, teachers, spiritual pastors and masters; To order myself lowly and reverently to all my betters; To hurt nobody by word or deed; To be true and just in all my dealings; To bear no malice nor hatred in my heart; To keep my hands from picking and stealing, and my tongue from evil speaking, lying and slandering; To keep my body in temperance, soberness, and chastity; Not to covet nor desire other men's goods; but to learn and labor truly to get mine own living, and to do my duty in that state of life unto which it shall please God to call me."

There is another rule of conduct usually designated as the Golden Rule: "Do unto others as you would they should do unto you," and modern ethics has added, "but do it first," and therein in this modern appendage lies the crux of our undoing.

Corporation policy should consist in so training subordinates that they will learn, teach and apply the foregoing precepts, that they will have faith in the integrity of those whom they represent and reflect that faith, and impress the public with their sincerity in the promulgation of such integrity, for personally I have no use for that man, who is not loyal to the interests which he represents—he is, if taking compensation from a company whose actions he does not and will not defend, or whose policies he does not or will not reflect, acting every day a living lie, and is therefore unworthy of confidence, and some day his misdeeds will be disclosed.

"I would rather be a dog and bay the moon than such a Roman" said Brutus, and any man false to his trust should be thought less of than a moon-baying dog—to such a man Benedict Arnold would by comparison be classed a hero.

Having dwelt upon the relation of the public policy of a corporation that is borne by the employes to the consumers of the corporation, and which relation it seems to me to be of primary importance, we will now take up the question of relation of the corporation itself to the public.

First and foremost as a factor overlying the broad question, is the matter of service given to the public by the corporation; for in these sensitive days, days of criticism and fault finding, the service of a corporation must be, as was Caesar's wife, above suspicion. People are intolerant today of mediocrity; the standards of excellence in all of the walks of life have been so raised by necessities that nothing but service approaching perfection will be tolerated, and no public service corporation can hope to maintain the favor of the public, no matter how exact its every course of conduct may be, unless it gives to the people that which they have a right to demand and which the people expect by reason of the tax which they have to pay therefor.

This service in these days of transportation by means of electrically propelled vehicles, in the large manufactories dependent upon electric service, in the general lighting of buildings, both commercial and residential, and for gas in continuity of supply because of its uses for domestic and industrial purposes, makes for and emphasizes the necessity of this feature of public policy.

And aside from the question of continuity of service must, of course, be considered the larger question of perfect service and the furnishing of a stable, equal character of product. The reputation of firms manufacturing food products is maintained only by a constancy of the quality of the commodity furnished, and this should be more particularly so in the question of commodities furnished monopolistically by public service corporations, for there is generally no escape from the service rendered. The element of competition, while being largely destructive on questions of revenues to the corporation, is not largely extended in matters of service to many, one company usually retaining the service of the majority in any community. It should, therefore, be the duty of the corporation and its managers to see that its forces are so organized, its spirit of discipline so maintained, and its team work so arranged, that its policy in the matter of service can never be questioned; and one of the ambitions of the young engineers of today having to do with the service of corporations, should be to strive for the maintenance of that high standard that he knows the public is entitled to and requires; and it should be the policy of the corporation to so educate these engineers as to produce in them nothing but that desire.

Next to the question of service comes the question of personal contact with the consumer; that personal contact is reflected from the very highest by the personal equation of which I have before spoken, in

raising the individual to a realization of the deeper question of the corporation policy as going to the ideals of the management. Courteous treatment of consumers to produce a feeling of interest in the corporation, cannot be fully engendered in the rank and file of employees unless that same personal feeling is brought about by the courteous treatment of the employees by the corporation head. This particular phase of social economics is being broadly viewed as a necessary self-protective measure by all large employers of labor. Rather let me here correct the ordinary expression, which I have unconsciously used, of large employers of labor, and say the paymasters of labor, because concretely considered, corporations are after all but the fiduciary agents of their staff. The sale of their commodities to the public, and the revenue obtained thereby, are retained largely in trust for repayment to those employed. It is a reasonably safe assertion to make, that in the corporations known as quasi public, more than 90 per cent of their gross receipts annually are paid out in the form of payroll checks, not only to its own employees, but to the employees of those from whom it buys materials and supplies. I had occasion to say in a recent lecture delivered before the San Francisco Chamber of Commerce, that the stockholders of the public service corporations of this state receive less than 2 per cent upon their equities in the property, the bulk of the money received going back to the ultimate consumer, directly or indirectly.

Returning again to the subject of the courteous relation as between the paymaster and the recipient, we will find that the moral tone, whether it be of a high or low standard, will more or less permeate the masses and be reflected in all relations with the public. The public as a general rule is an uncomplaining body and will put up with many inconveniences without demur; the percentage of those needing close attention being the minimum, there is every reason, therefore, why the effort of public service corporations should be directed along the line of least resistance, for resistance provokes friction, and friction heat, and this element heat in argument and discussion must be reduced by the application of the lubricating oils of kindness and courtesy, and it takes but little time and effort to accomplish that most desirable end. Corporations to provoke the proper public policy should zealously guard every utterance, to see that nothing is said or authorized to be said on its behalf that is not an absolute truth. It should never forget an obligation, and no matter how burdensome it may become, due to errors of judgment, it should be carried out.

Little things mark men of greatness. The bigger things of life and in the attitude of men and peoples, generally take care of themselves. One of the little things which very often provokes an antagonistic public feeling is the disregard by responsible officials of a company of the ordinary courtesies that go towards acknowledgment of letters. In my experience of many years I have found more difficulties to overcome, more sores to heal, and more damage resulting from the indifference of officials of the corporations in replying to communications received from their business associates or from complaining customers. A signed letter to an appeal, whether right or wrong, acknowledging receipt and promising attention, is often the salve which heals the wound, imaginary or otherwise, of the consumer; it paves the way to a better realization of the duties and obligations of each other.

The personal appearance of those coming into contact with the public is another one of the things that make for a public policy favorable in its character, and it is too often not appreciated, either by the management or by the men themselves. The man who is clean in his personal appearance is pretty apt to be clean in his habits and morals, while nothing discredits one so much as lack of pride in one's personal characteristics of this character, and friends are easier gained in contact with the public by one who approaches the public bearing evidence of that cleanliness of person and mind.

Summed up, the whole question as to whether a corporation can and will be popular with the people, to the same degree that a storekeeper seeking trade is, will come only from following the very fundamental principles that since the existence of time have been laid down for the betterment of the human race, and just as soon as corporations realize that they have no particular God-given rights, that they are the servants of the people, that they have a commodity to sell which can only be profitably sold by its presentation in an absolute business way, and just as soon as the public appreciates that a corporation serving the public is but an adjunct of the merchant class, that it is seeking to build up and not destroy, and as soon as politicians by proper regulation are made to feel that their sphere of public activitiy will no longer lie in the unwarranted and uncalled for abuse of corporations, nor more than it would lie in the unwarranted abuse of the merchant or commercial class—then will come that era for which all honest men are striving, which is, to be permitted to do its business on a business basis, and to obtain for its commodity a proper return upon the moneys actually and honestly invested in service to the public; and as a proof that there is nothing new in the dissemination of questions of policy, and that it was preached and practiced years ago and made the foundation for the betterment of man, it is perfectly appropriate at this time and in closing to recite to you, for your benefit and for your digestion and analysis, the advice which Polanius gave to Laertes, his son, as is set forth in the book of Hamlet.

Look thou Character—
Give thy thoughts no tongue
Nor any unproportioned thought his act.
Be thou familiar, but by no means vulgar.
The friends thou hast, and their adoption tried,
Grapple them to thy soul with hoops of steel,
But do not dull thy palm with entertainment
Of each unhatched, unfledged comrade.—Beware
Of entrance to a quarrel, but, being in,
Bear it that the opposer may beware of thee.
Give every man thine ear, but few thy voice.
Take each man's censure, but reserve thy judgment.
Costly thy habit as thy purse can buy, rich not gaudy,
For the apparel oft proclaims the man.
Neither a borrower nor a lender be,
For loan oft loses both itself and friend,
And borrowing dulls the edge of husbandry.
This above all—To thine ownself be true,
And it must follow as the night the day
Thou canst not then be false to any man.

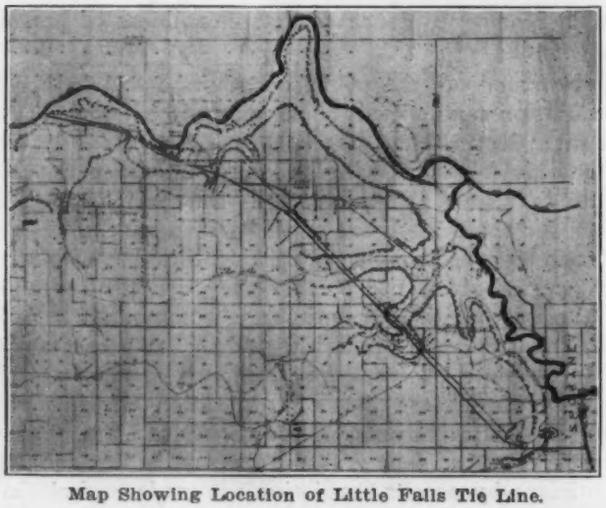
LITTLE FALLS TIE LINE.

BY JOHN B. FISKEN.

[Concluded.]

Location.

This is a subject that is always deserving of very great consideration, and involves a great many factors. The more nearly a line approaches a straight line the better, both on account of saving in costs, and more particularly on account of being more reliable and having better operating features. Sharp corners and turns should always be avoided for the reason that they call for special and expensive construction. A tower, unless specially designed to withstand the downward stress imposed by a guy should never be guyed except in a horizontal direction. The author has this fact impressed upon him by seeing some towers very badly deformed by being guyed when no provision had been made in the design for these unusual strains.



Map Showing Location of Little Falls Tie Line.

As a general rule a line should be built straight even though it should cross private property, provided the cost of the necessary right of way does not exceed the cost of building by another route. The cost of the right of way may in many cases, from an operating standpoint, exceed considerably the saving by building around, but the amount of this excess is almost impossible of estimating and has to be left to the judgment of the locating engineer. A right of way has to be acquired when towers are to be used as these cannot be located on country roads.

The map shows the direction of the line and makes the location easily understood.

Right of Way.

Before the permanent location was entirely finished the right of way agents were at work. The obtaining of a right of way such as has been indicated is a very slow and tedious job. Absentee owners have to be found and frequently they are found in foreign countries. Unsettled estates are encountered and probate court proceedings or friendly condemnation suits are necessary. The owner of some five acre tract or a quarter section of good basaltic rock with some scrub pine, a small corner of which may only be crossed by the wires requiring no towers to be set on the land is too busy doing nothing to make up his mind. In such a case repeated visits from the right of way agent are necessary before the papers are signed up. Then again the thrifty farmer who had sworn to the assessor that his land is not worth over $10 an acre finds a line of little white stakes across it and suddenly wakens up to the fact that these stakes have increased the value of his land twenty fold. Then the lawyers and a jury in the superior court get busy with the condemnation proceedings and the farmer in the end finds that he has not as much in his pocket as he would have had if he had settled with the right of way agent. To the credit of the farmers in the Inland Empire be it said that such condemnation proceedings seldom have to be resorted to. A company acquiring a right of way such as indicated must however expect to pay at least twice what the land is worth.

Two kinds of right of way were acquired. One consists of an easement to clear the right of way and build and maintain the line and patrol road. In this case the title to the land remains with the owner. The other kind is when a warranty deed to the land is given. In either case where the right of way is through timber the right is given to cut any danger trees off the right of way. When the nature of the ground is such that a construction and patrol road cannot be built with reasonable grades it is necessary also to acquire the right to build a road off the right of way.

The Construction Work.

The right of way was cleared of all trees and brush. The trees in the majority of cases were cut into saw logs and marketed. In a few cases the trees were cut into cord wood. All limbs, brush and shrubbery which were not of use were burned, leaving the right of way clear and open. On the total of 361 acres of right of way the timber cut amounted to 833,798 board feet. A wagon road already referred to was built along the right of way which not only facilitated the delivery of material for the line during construction but is now used by the patrolmen in making their regular patrols. This road is not to be compared with a public highway, but is a good serviceable road, although narrow, as all the logs from the right of way and all construction material had to be hauled over it.

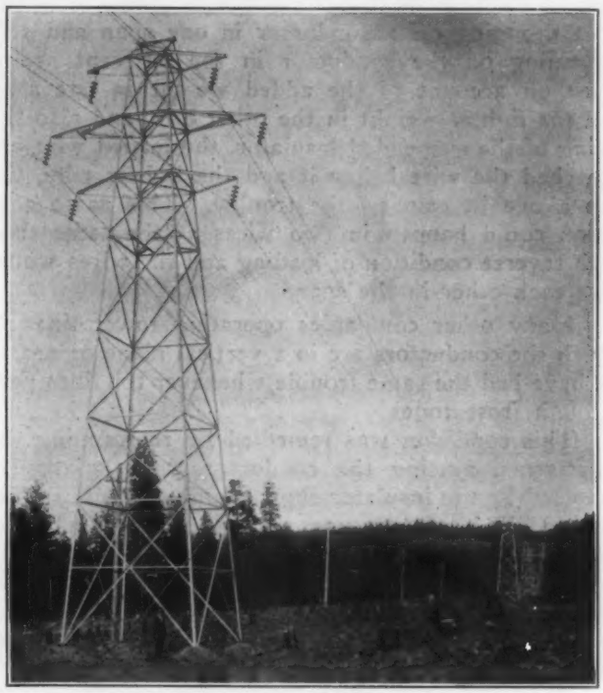
About eight months' time was required for the clearing and road building, all the work being done by one crew, ranging in number from 30 to 90 men. This crew moved camp four times, or camped at five different locations, to cover the whole length of line. Usually the plan was to work about three miles from camp each way before moving.

The organization of the clearing and road crew consisted of, a foreman, a sub-foreman, a team foreman and timekeeper, a cook, one or two cook's assistants, according to the size of the crew, teamsters and laborers. This crew usually had five or six four-horse teamsters because of the large amount of logs to be handled and decked. They also distributed all the tower steel and wire at pre-determined locations.

A small crew was started setting a few of the footings for the towers before the tower steel arrived. No separate camp was maintained but they worked along with the clearing crew.

When the tower steel arrived, tower assembling and erecting crews were put out. They also set the remainder of the footings for the towers. Three crews were used, one crew being in the field about four months and the other two crews about two months each. The first crew moved camp twice while the others moved only once. The size of the crews varied from 25 to 50 men.

The organization of each crew was practically the same, consisting of a foreman, three sub-foremen in charge of the assembling crew, erecting crew, and laborers; a timekeeper, a cook, cook's assistants and two teamsters. The balance of the crew was made up of riggers and laborers.

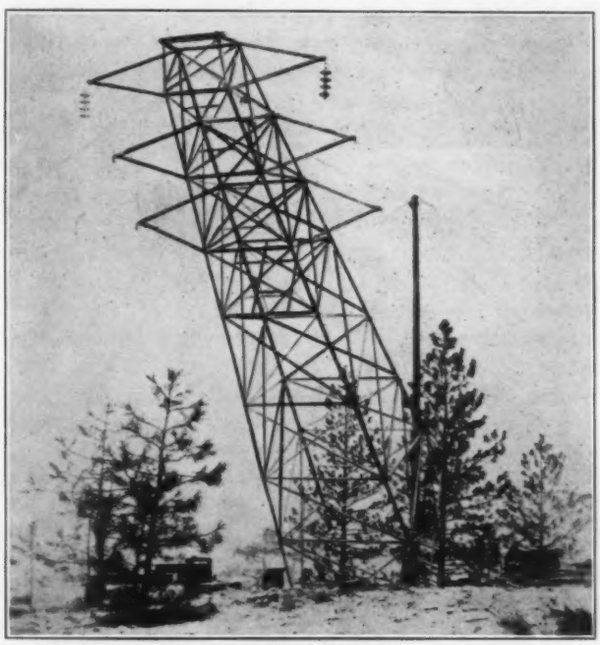


View of Tower Line and Telephone Line Showing Typical Clearing; Also Showing Re-arrangement of Cross-arms.

The first footings were set by means of a template made up of angle irons. At each corner of this template shoes were placed, having the same batter and shape as the tower legs. The holes were dug, then the footings were lowered into the holes. The template was then placed and leveled and the footings attached to the shoes and adjusted until the shoes and footings were in line. There were two main objections to this procedure, one was the weight and unwieldiness of the steel template and also its tendency to get too hot to handle with comfort. The other objection was that after the footing was set in place and the earth thrown back into the holes, strains were produced between the template shoe and footing and when the bolts were loosened, the footings would spring out of place and alignment.

The next method of setting footings tried was to set them by means of chalk lines and a plumb bob over each corner, then moving the free footing to position and grade and slowly back-filling. This method gave a more accurate placing of footings, although it was slow work yet not slower than using the steel template, considering the time necessary to assemble and take it apart and transport it between towers.

The third method used was to raise the tower until nearly vertical, then bolt two footings which were already in the holes, to the tower legs; pull the tower a little past vertical, resting on the two footings in the holes, slip the rear footings into place, bolting them to the towers. Then the tower was leveled by raising or lowering either the front or rear legs. Toward the last of the work, one foreman used a very simple wood template made of 1 x 6 in. lumber with the proper batter. This was leveled with a spirit level and the free footings were fitted to the corners. This was the simplest method tried and by far the cheapest and quickest. The towers set up on these footings just as accurately as they did on those where painstaking care was made to get them within a sixteenth of an inch.



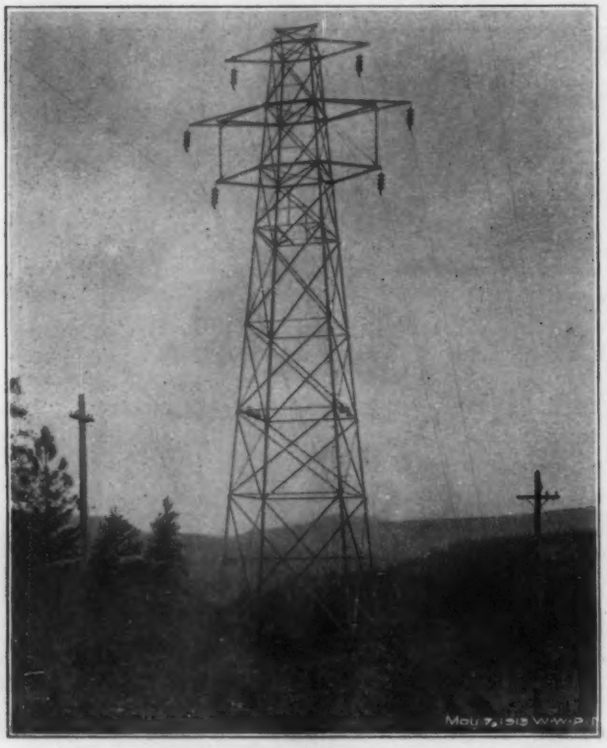
Erecting a Tower.

The tower steel was received at the various railroad distributing stations, six in number, in bundles, similar pieces being together. The steel was delivered at the survey stations designated for tower locations. When the assembling crew came to the holes, two legs were laid out with the ends near the holes. Then the pieces that made up two of the sides of the tower were laid out in place on the ground and the two sides of the tower were assembled first. These were then raised to a vertical position and the top and bottom panels were put in. Every man in the assembling crew had his certain pieces to pick out and assemble.

Next came the erecting crew. The erection was done by means of a gin pole about 35 ft. high. At its foot was attached a crab or windlass, by means of which the tower was raised into position. The gin pole was guyed by two side guys, a back guy and a front guy which was laid out at an angle so as not to interfere with the raising of the tower. These guys were ½ in. steel cable and were attached to trees if available, or to buried anchors. The main raising

cable was a 5/8 in. steel cable running through double sheave roller bearing steel blocks.

The gin pole was dragged between towers by a team, with all the rigging attached and its butt was placed ahead of the tower, location on line; one of the blocks was attached to the tower near the middle cross arm by means of a chain encircling the tower. The pole was then raised off the ground by hand. Then the team was hitched to the fall line and the pole pulled into place and guyed. The line was then attached to the crab and the tower raised. As the tower was being raised, it was guyed by both a back guy and side guys. After the tower was permanently in place the gin pole was lowered by means of its own weight being handled by the cable through the block on the tower. It was then pulled to the next tower location and the same operation repeated.



Crest Tower at Little Falls, Cross-arms Rearranged for Heavy Vertical Stress.

The organization of the stringing crews was similar to the assembling and erecting crews except that there were not so many sub-foremen for the work was more centralized. The ground wires were strung first. The reels were jacked up and the cable pulled out by team. It was then put in position, pulled to tension and fastened. Dynamometers were used to pull the cable to tension, the foreman noting the temperature and from a stringing chart determining the tension required or the prevailing temperature.

The aluminum conductors were handled in a similar manner except that more care was taken not to nick or scar the cable.

The Operation of the Line.

In the three years that the line has been in operation, the insulators have given very little trouble. Two of them have been damaged by lightning but in each case the top and bottom units were the only ones damaged and the line was kept in commission, using the remaining two units, until repairs could be made. Two insulators have been broken, presumably by being shot with a gun.

The first winter the line was in operation, trouble was experienced in certain parts of the country where it traversed frost regions. The line would go out but no one would know the cause. When the line was patrolled, the conductors were found to be pitted and burned in the spans between towers.

After careful study and a series of tests, the conclusion was reached that the trouble was caused by the frost dropping off a conductor in one span and still remaining on the conductor in the adjacent spans. Then on account of the added weight in one span and the lighter weight in the other two, and also the swing of the suspended insulator, the loaded wire approached the wire below it and the lighter wire, the one above it, causing the trouble. This same condition could happen in two wires at the same time with reverse condition of loading and the wires would pass each other in the span.

Many other companies operating tower lines in which the conductors are in a vertical plane or nearly so, have had the same trouble whenever the lines pass through frost zones.

This condition was remedied by rearranging the cross-arms, putting the conductors in a triangular shape. The top insulator support was moved in, while the middle insulator support was extended and the lower cross-arm remained as before. One half-tone shows a crest tower which is provided with posts and bracing to ease the downward pull. Since this change has been made no trouble of the nature indicated has been experienced.

The line which is 28.04 miles in length is patrolled once a week regularly and more frequently when weather conditions are such as to make it advisable to do so. This work is done by two patrolmen, but they have charge of other lines as well as the Tie Line.

For the convenience of the patrolmen a telephone line has been built on the same right of way as the Tie Line and at convenient intervals call boxes have been installed so that at all times the patrolmen can be in close touch with the office.

The greatest commercial value of wireless in the United States is for communicating between ship and shore or between ship and ship. Transatlantic communication has been established between the government station at Arlington, Va., and the Eiffel Tower in Paris, as well as stations at Panama and San Francisco, but this is only occasional and the service is not open to commercial business. Between the Canadian station at Glace Bay, Nova Scotia, and the United Kingdom an immense volume of press communication is carried on, most of the news from London and from the continent of Europe which is printed in the newspapers of the United States and Canada, according to one statement, being sent by wireless to Glace Bay and relayed by cable or overland telegraph to New York and the other large centers. Service is also available to Honolulu and to the West Indies and is utilized to some extent.

ELECTRICAL CONTRACTORS' DEPARTMENT

IS UNDERWRITER'S INSPECTION NECESSARY IN OREGON?

BY F. D. WEBER.

(Continued.)

To combat the fire loss, in addition to electrical inspection, the following methods are used by the National Fire Protection Association, and the National Board of Fire Underwriters:

Common Hazards, which are classified as simple carelessness, use of matches, metal ash cans and waste cans instead of wooden receptacles, chimneys and flue construction, heating apparatus including stoves, furnaces, etc., electric wiring, fire stops in buildings, building materials and construction, they endeavor to regulate by city ordinances.

Special Hazards, which are classified as lightning, fireworks, other explosives, petroleum, gasoline, etc., and the special hazards incident to various manufacturing operations, they endeavor to regulate by city ordinances and building codes.

Educational measures such as printed circulars, articles in magazines and papers, standard specifications for construction and apparatus.

Inspection Bureaus, such as deputy fire marshal, who are supported by the insurance interests and given the police authority from the municipalities. These officials are supposed to inspect and report regarding all common and special hazards. It is only possible to have these inspection bureaus in the larger municipalities.

State Fire Marshal. The insurance interests endeavor to get the office of State Fire Marshall created in all the states to handle the rural districts, suppress arson and in every way diminish the fire loss. The difficulty in getting this official appointed is the fact that the states generally desire to throw the burden of support upon insurance interests.

National Board of Fire Underwriters' Reports. These reports are made by a special committee of engineers representing the National Board of Fire Underwriters and consists of a detailed report covering the conflagration hazard, water supply, all manners of inspections within the city reported on and contain recommendations for improving conditions.

Form K No. 31

UNDERWRITERS' EQUITABLE RATING BUREAU

ELECTRICAL REPORT

Oregon City, Clackamas County, Oregon

Original Inspection, July 10 to 16, 1913.
Re-inspection, January 14, 1914.

The Portland Railway, Light & Power Company supplies electric energy from the hydro plant within the city limits. One 2300-volt primary circuit is used for all incandescent lighting and motor load. One arc circuit of a total voltage of approximately 6000 volts supplies 69 lamps of 5.5 amperes and 85 volts

No street clusters used.

Pole line construction in fair condition.

Interior wiring in bad condition.

The city does not maintain inspection, but this Bureau has taken steps to secure the enactment of an ordinance to provide such.

Telephone and telegraph instruments are protected by fuses and arresters.

The municipal fire alarm system is hardly worthy of mention, there being but three boxes of the Gamewell type. The line construction and system is not standard.

Electrical Report of Bureau; Page 1 of Form K.

These reports are made every five years and cover all important cities of over 100,000 population.

Fire Patrol. The insurance interests in nearly all the cities of the United States maintain a fire patrol which does everything possible to alleviate the insurance loss from water and smoke. They also carry small fire fighting apparatus and many times reach the fire before the fire department. In this way, many times an appreciable amount of salvage is obtained.

INDEX OF DEFICIENCIES

1. Unapproved cord adjusters.
10. Attics not properly bored and bushed.
11. Attic inaccessible.
51. Cords too long, (a) or used other than as pendants.
52. Cords in show windows are prohibited.
54. Pendant cords ornamented with tinsel paper or gauze.
55. Portable lamps, (a) motors, (b) fans, or (c) fixtures not connected through reinforced cord.
56. More than one cord in a rosette.
58. Pendant cords attached to circuits without approved fittings.
59. Unapproved cord adjusters.
60. Cord circuits.
62. Cord used for outside wiring not approved.
101. Wood cleats, staples or nails on insulators prohibited.
110. Cabinets not properly made (a) or lined.
111. No doors on cabinets.
112. Cabinet doors not lined
114. Cabinet inaccessible
126. Circuits overloaded.
130 Broken fittings.
131. Fittings loose from support.
134. No support provided for fittings.
140. Unapproved (a) or improper use of open link fuse blocks.
173. Service wire bushed with flexible tubing; must be porcelain or conduit.
176. Porcelain and flexible tubing out of place.
220 Low potential circuits not properly grounded on the direct current three-wire system, (a) alternating current secondary system.
235. Electric iron improperly installed.
239. Installation in such a hazardous condition that same should be completely rewired.
264. Joints not soldered, (a) or taped, (b) or properly made.
265. Outlets not in use should be thoroughly taped up.
281. Improper switch (a) or none at entrance point.
282. Entrance switch improperly located (a), or not readily accessible.
430. Lamp sockets not bushed.
431. ½-inch sockets used on reinforced cord instead of ⅜-inch sockets.
433. Wires of opposite polarity in contact (a) or too close together.
435. Wires against or too close to grounded pipes, or improperly protected.
494 Wires not protected where liable to mechanical injury.
495 Wires in contact with outside awning (a) or with metal front or side of building.
497. Wires not bushed, (a) or bushed improperly through walls, floor or partitions.
499 Wires not attached rigidly in position, (a) or loose from support.
502. Wires not supported at sufficiently frequent intervals.
507. Service wires in bad shape or not properly attached to or insulated from building.
508. Wires in contact with other materials than insulators.
509. Unapproved wire.
513. Wires not properly supported over roofs
513. Wires in open work not properly spaced.
515. Bare wire.
516. Wires knobbed (a) or cleated over horizontal surfaces.
517. Dead circuits and wires should be removed.
518. Wires must enter cabinet through openings made for that purpose only.

Electrical Report of Bureau; Page 2 of Form K.

In addition to the above methods of combatting the fire loss, the surveyors of the rating bureaus inspect and reinspect all business buildings and special hazards within the various towns and cities and apply specific charges for any hazardous conditions they may note.

Various sections of the United States are divided into districts with a board or bureau over same, formed by the insurance companies operating in these sections, for the purpose of obtaining insurance rates on buildings and their contents. In Oregon this organization is known as the Undewriters' Equitable Rating Bureau. This is an association created and existing under the insurance laws of the state of Oregon.

In order to obtain safe conditions as regards electrical installations, this Bureau maintains an electrical department as part of their association.

In Portland, the electrical department endeavors to maintain supervision over all new electrical installations in all manner of installations except dwellings. Outside of the city of Portland, they have been making thorough inspections in all buildings except dwellings, in all the larger towns and cities in Oregon.

This inspection also includes the inspection of the booths in motion picture shows, motion film exchanges and storages and private and municipal fire alarm systems, throughout Oregon.

The methods pursued are the following:

(1) In new buildings in Portland the work is watched as it is installed and the electrical contractor or owner is notified if the same is not being installed according to the N. E. C. rules and requirements. If after exhausting all means the Bureau fails to get the proper installation the only recourse they have is to make a change in the insurance rate on the building.

It is seldom necessary to resort to this increase in rate, as nearly all architects will aid the Bureau in getting the proper installation. Also nearly all specifications written by architects require the electrical contractor to obtain a written certificate of inspection from the Underwriters before final payment is made to the electrical contractor.

Your "special attention" is called to the defective installations in the following risks, previous readjustment of rates had been made:

WEST SIDE OF MAIN STREET

Party Responsible	Class	Index	Blk.	Sh.	Page	Rating	Defects
Chinese laundry 313	D	8	3	20	13	14	.....220.
Leonard Charman . .407-411	B	11	3	16	13	7	.....Electric Hotel office: Passable. Second floor: 60. Third floor: 60. Drug store: 172, 392a, 508.
E. A. Brady, ...413-415	B	12	3	16	13	11	.....Restaurant: 56, 60. Barber shop: 172, 509. Confectionery: 336. Saloon: 55, 497, 508. Second floor: Passable.
G. A. Harding...NW cor 5th	D	17	4	16	14	2	.....60, 101, 439, 508, 517.
G. A. Harding 502	D	15	4	16	14	4	.....10.
County C'house..NW cor 8th	D	41	7	19	16	17	.....392a.

EAST SIDE OF MAIN STREET

Joseph Supple	D	58	37	19	6	9	.....225.
Frank Jagger.....NE cor 7th	D	75	34	19	7	13	.....Restaurant: 51, 55, 497. Second floor night sign: 60. Meat market: 56. Cigars: 60, 392a.
Chinese laundry 313	D	80	38	20	4	8	. ..230.
....	D	74	34	19	19	7	.....No inspection; locked.

Defective installations were found to exist in the following risks, and the owners have been advised:

WEST SIDE OF MAIN STREET

Party Responsible	Class	Index	Blk.	Sh.	Page	Rating	Defects
Oregon City Mfg. Co. Eet 3rd and 4th Sts		1	271	20	11	16	.....Office: 60. Storage: 51, 51a, 55, 59, 497. Warping: 55, 431. Weaving: 430, 431, 493, 500a, 509. Basement: 55, 130, 131, 340, 431, 490. Second floor: 1, 55a, 509.
Oregon City Laundry NW cor 3rd	D	3	2	20	13	3	.....55, 392a.
Burmister & Andus.....317	D	6	3	20	13	16	.....Restaurant: 51a, 55b, 56, 60, 392a.
Wm. Andresen 319	D	7	3	20	13	16	.....Tailor: 52, 502.
Gambrinus B. Co..SW cor 4th	D	8	3	20	13	20	.....Saloon: 55, 60, 101. Second floor: Passable.
Pope & Co.....NW cor 4th	B	9	3	16	13	3	.....Hardware: Passable. Second floor: 391, 494, 517.
John Tobin . . ....,403	D	10	3	16	13	4	.....Confectionery: 55, 60. Second floor: 110a. Third floor: 140a.
W. A. Dimmick ..,.....419	D	15	3	16	13	17	.....56, 60, 392a, 495.
W. A. Dimmick...SW cor 5th	D	15	3	16	13	31	.....55, 56, 172, 430, 508.
Geo. A. Harding.....506	D	19	4	16	14	6	.....52, 60.
Geo. A Harding.....507-511	B	19	4	16	14	8-9	.....Curio store: 51, 55, 392. Food store: 60, 392a. Drug store: 11.
Kelley Estate 517	D	22	4	16	14	14	.....Confectionery: 55a. Second floor: Passable.
Kelley Estate 519	D	23	4	16	14	16	.....Bakery: 392a.
Portland Ry., L. & P. Co..617	D	33	5	16	13	13	.....139.
Wm. Andresen....SW cor 7th	B	33	5	16	13	15	.. ..Jewelry: 114. Saloon: 60, 113. Drug store: 55, 56, 60, 392a. Second floor: 113. Basement: 51, 509. Second floor: Passable.
Richard Petzold 703	D	35	6	19	15	23	.....Barber shop, 111. Restaurant: Passable.
Hon. Thomas Ryan.....707	B	36	6	19	15	25-26	.....Com. Club: 56b, 113. Basement: 55, 60.
Canfield Bros.	B	37	6	19	16	3	.....Drug store: 60, 392a. Paint department: 392a.
E. G. Canfield	B	38	6	19	16	4	.....Jeweler: 56, 60. Second floor: 11.
E. G. Canfield	B	39	6	19	16	9	.....Undertaking: 11.
J. E. Armstrong 615-615	D	42	7	19	16	22	.....Millinery: 336. Plumbing: Disconnected.
J. E. Armstrong..SW cor 8th	D	43	7	19	16	24	.....Restaurant: 54. 2nd floor: Passable.
J. B. Fairclough..NW cor 10th	D	45	9	6	17	13	.....51, 55, 60.

Electrical Report of Bureau; Page 3 of Form K.

WEST SIDE OF MAIN STREET—Cont'd

Party Responsible	Class	Index	Blk.	Sh.	Page	Rating	Defects
Frank Busch....NW cor 11th		47	10	6	18	6	.....General store: 60. Basement: 58. Second floor: 58. Busch's Hall: 113. Balcony post lights: 230.

EAST SIDE OF MAIN STREET

Miller & Williams 302	D	49	23	20	4	5-6	.....391a, 507.
Ray Clark 320	D	51	25	20	4	14	.....55, 60, 497.
F. G. Anderson 414	D	57	27	16	5	7	.....Barber shop: 60. 2nd floor: Passable.
Roswell Holman 423	D	59	27	16	5	10	.....Second floor: 10. Saloon: Passable.
Geo. C. Harding...NE cor 5th	B	61	26	16	5	20	.....Barber shop: 60. Furnishings: 52, 392, 497.
C. D. & D. C. Latourette.....	B	61	26	16	6	3-5	.....Shoe store: 60, 430.
Gambrinus Br. Co.....524	D	66	26	16	6	18-19	.....Hardware: 51a, 56, 60, 112. Poolroom: 51.
Gambrinus B. Co .SE cor 6th	D	67	26	16	6	18	.....Hotel: 56, 60, 112. Second floor: Passable.
Williams Bros. 413	D	71	25	16	7	3	.....Barber shop: 60. Real estate and second floor: Passable.
Oregon City	D	76	24	10	7	14-15-16	.....Engine house: 60.
Frank Jagger 714	B	77	24	10	7	15	.....Cigars: 60. Saloon: 60.
Weinhard Br. Co..NE cor 8th	B	82	23	10	9	2-3-4	.....Printing: 55, 497. 2nd flr: 10, 515. Grocery: Passable
M. J. F. Hodge.....		88	20	6	9	11-12	.....Stable: 507.
F. Grissmon....East on 6th St	D	40	24	16	6	29	.....Hotel: 113.

WEST ON SIXTH FROM MAIN STREET

Bank of Oregon City.....	IC	20	—	10	—	6	.....174.

Defective installations have been corrected and made satisfactory in the following risks, of which the owners had been previously notified:

WEST SIDE OF MAIN STREET

Party Responsible	Class	Index	Blk.	Sh.	Page	Rating	Defects
Bank of Oregon City 609	D	27	8	16	15	2	.....Rear shop: 51a, 55, 56, 60, 134, 260, 508.
Bank of Oregon City.....613	D	29	8	16	15	9-10	.....Grocery: 52, 60. Printing: 55, 60
F. Jagger 613	D	30	8	16	15	9-10	..... Ten-cent store: 55
R. G. Canfield....SW cor 8th	D	40	9	10	16	11	.....53.
McLaughlin Inst.	D	44	9	10	17	8	.....School: 112.
Oregon Com. Co..SW cor 11th	D	46	9	6	17	25	.....52, 60, 110, 430, 516, 520

EAST SIDE OF MAIN STREET

C. D. & D. C. Latourette..513	B	63	28	16	6	5	.....Bank: 60.
Frank Jagger 514	D	64	28	16	6	9	.....Second-hand: 58, 260a, 392, 430, 502.
H. Stevens..... NE cor 6th	D	69	25	16	6	24	.....Dry goods: 55, 60. Cigar store: 60 Second floor: 112.
Howell & Stevens SE cor 7th	D	72	25	16	7	5-7	.....Department store: 55, 60. Basement: 112, 225. W O W hall: 392a Sign: 60, 62
First M. E. Church. ...	D	73	25	16	7	5-7	. Second floor: 120. Adams Dept. Store: Passable
Mrs. E. Knapp ..NE cor 10th	Ven	80	22	10	9	22	.....First floor: 54, 56, 60, 111 Second floor: Passable.

SOUTH SIDE OF ELEVENTH STREET

Clark School Board SE cor Harrison	D	91	426	12	27	8	. ..55, 60

EAST SIDE OF WATER STREET

B. P. O. E.	D	92	5	16	29	16	.....Basement: 58. Lodge: 120 Piano and desk: 60.

Moving picture machines are improperly rated had been previously readjusted installed in the following risks, in which the

Party Responsible	Class	Index	Blk.	Sh.	Page	Rating	Defects
Charles Schram	D	24	4	16	14	17	.....Booth not standard.
Geo. A. Harding	B	61	26	16	5	20	.....Booth not standard.
W. A. Long.....	D	70a	24	10	7	25	.....Booth not standard.

Portland, Oregon, February 20, 1914 Jas. N McCune, Secretary

Electrical Report of Bureau; Page 4 of Form K.

(2) Outside the city of Portland there exists a different condition and it is impossible for the Bureau to supervise the new work due to the expense necessary to have enough inspectors to cover the field, Therefore, the Bureau endeavors to get all the local electrical ordinances passed which is possible, based upon the rules and requirements of the National Electrical Code, and have the fire chiefs, city engineer or any competent available person appointed as the inspector.

The following towns now have ordinances and inspection by local inspection departments: Hillsboro, Ashland, Medford, Grants Pass, Albany, Salem, Astoria, Eugene, Roseburg, Marshfield, Klamath Falls, Portland, Dallas, Independence, Sheridan.

[To be continued.]

CALIFORNIA ASSOCIATION OF ELECTRICAL INSPECTORS

Section of N. A. E. I.

C. W. Mitchell, President. Arthur Kempston.
Wm. G. Pennycook, Vice-Pres. B. C. Hill, Executive Comm.
John W. Carrell Secretary-Treasurer, 55 Fulton, San Francisco.

The purpose of this organization is to standardize the common practice in electrical construction with the National Code as the general standard.

Questions pertaining to electrical construction will be answered in these columns, but only from the point of view of the Code. This is a voluntary organization and the answers published under this heading must not be construed as authoritative, or binding. No attempt will be made to correllate the answer from the several Inspection Districts, as an occasional difference of opinion will tend to induce further study on subjects. All questions will be passed upon by an executive committee.

Address all communications to the secretary.

By the Secretary.

The regular meeting of the C. A. E. I. was held in City Hall Annex, Oakland, on April 18th. The assembling of the inspectors brought forth many expressions of agreeable surprise regarding the growth, the changed skyline and the apparent prosperity of the city on the east side of San Francisco Bay. My, what a place to inspect!

George R. Babcock assisted Chief Inspector B. C. Hill in welcoming the members. In a few well-timed remarks he pointed out the larger feasibility of covering the moderate rather than the extreme case, when arranging or interpreting rules of construction.

The session was called to order at 2 o'clock by Vice-president Pennycook. The topic, "Main Service Wiring" was discussed until 4:30. A detailed account of this discussion will appear in a future issue of the Journal

After adjournment many of the members accompanied Mr. Hill to the Central Fire Alarm Station where well appointed quarters and an up-to-date system were found. One significant comment during the visit was on the passing of the electric horse-let-loose and the coming in of the automobile starter set in motion from the central fire alarm station.

Questions and Answers.

Ques. 1. A wooden cabinet is installed for ten lighting circuits eight of which are run knob and tube, and the other circuits and the feeders in conduit. Will this pass inspection?

Ans. 1. Yes, if condulets are used on conduit.

Ans. 2. No. Rule 26 (t) and 70 (b) require a metal cabinet.

Ans. 3. Sorry, but would be forced to pass is conduit was tied together and to ground and provided with proper terminals.

Ans. 4. No. Rule 26 (t) covers this.

Ans. 5. Yes. Would require condulets in cabinets.

Ans. 6. Yes, but would require a proper fitting on end of each conduit. See Rule 28 (d).

Ans. 7. Yes, if bonded, grounded and equipped with terminal fittings. Rules 23 (t), 70 (b), 28 (d).

Ans. 8. No. Not unless conduits were equipped with fittings of condulet type, were tied together and grounded.

Ans. 9. Should say that this was a conduit system because the feeders are in conduit.

Ans. 10. Yes, if Rule 28 (d) is complied with. This rule provides for special permission in such cases. Who says the Code is not consistent?

Ques. 2. According to Rule 83 (b) regarding compartments to enclose cutouts, does sign body which forms a completely enclosed and weatherproof compartment fulfill this requirement? If not, must the compartment be removed from the sign body or may it be constructed within same?

Ans. 1. Code Rule 83 (b) is very clear on that point. A separate compartment must be provided and may be placed either inside or on the outside of the sign body. The sign body may form a portion of the body of the cabinet for the cutouts.

Ans. 2. No, compartment must be separated from the rest of the sign body, but may be a portion of it.

Ans. 3. Must have separate compartment.

Ans. 4. Yes.

Ans. 5. No. Should be separate compartment, but may be in sign.

Ans. 6. Yes, but not in a vertical sign if the cutouts were placed at the bottom. A considerable draft exists in this kind of sign and a fire starting at a loose terminal communicated to the rubber would follow up inside very rapidly. Would consider a separate compartment either in or out of the sign body as the best practice.

Ans. 7. Rule 83 (b) requires a separate compartment in or out of sign.

Ans. 8. Would require a separate housing in sign.

Ans. 9. Rule 83 (b) states clearly a separate compartment, meaning completely removed from sign.

Ans. 10. No. Separate completely enclosed compartment either in or out of body.

Ques. 3. Rule 23 (d) paragraph 2-3. Do you interpret this to limit the number of receptacles per circuit for signs to thirty-two?

Ans, 1, 4, 7 and 8. No.

Ans. 2. No, but good practice endorses a rule limiting the number of outlets per circuit.

Ans. 3, 5, 9 and 10. Yes.

Ans. 6. It would seem to me that Rule 23 (d) paragraph No. 3, is there to provide for low voltage systems. For instance, 10 watt lamps on a 12 volt system. In this case each lamp would require 1.2 amp. and as 20 amperes is the maximum fuse allowed the number of lamps per circuit would be limited to 17. I would say that the lamps per circuit should not exceed 32.

AN INSPECTION LEGAL RULING.

The department of electricity of San Francisco has been advised by the city attorney that it is correct in claiming that it must approve the plans and specifications for electric work in buildings and authorize the work to be done before it can be begun. The department informed the city attorney that a certain corporation claimed that it could do such work without previous authorization, and that when completed it could file plans of the work and correct whatever part of it did not comply with the law, on being notified to do so by the department inspectors. To permit such a practice as this would be dangerous, the department stated, and the city attorney says that any one guilty of it can be prosecuted, as it is a violation of the ordinance governing electric wiring and installations.

Alaska water power resources on the Seward Peninsula favorably situated for development have been estimated by H. H. Henshaw of the U. S. Geological Survey to be between 30,000 and 40,000 h.p.

INDUSTRIAL GAS CALORIMETRY.

For many years all laws and regulations relating to manufactured gas were based on candlepower requirements, i.e., the gas burned in a definite burner at the rate of five cubic feet per hour was required to give a specified illumination of so many candlepower. This specification furnished a perfectly satisfactory control of the quality of gas delivered so long as the gas was chiefly used for illuminating purposes with the old style of open-flame gas burner. At the present time, however, this inefficient type of burner has been very largely displaced by burners of the Welsbach mantle type. Furthermore, a large amount of the gas sold today is used for cooking purposes and to some extent for operating small gas engines for power purposes. In these applications of gas it is the heating value that is of first importance and not the candlepower. It has been estimated that less than 20 per cent of the gas manufactured and sold today, indeed in many of our cities and towns less than 10 per cent, is used in the old type of open-flame gas burners. Notwithstanding this fact we still find in most of our cities and towns ordinances on the statute books requiring that the gas meet a definite candlepower test, while no attention has been given to the question of heating value, which is the important factor for over 80 per cent of the gas sold. Many of the candlepower requirements fixed by law are quite high, often requiring the manufacture of an expensive oil-enriched gas, which may not be the most economical gas to the public. The importance of the heating value of the gas is now being quite generally recognized, and where new legislation has been adopted recently and where public service commissions have considered the question of gas regulation and have gotten to the point of issuing regulations, the heating value standard is being generally adopted, supplemented in some cases by a moderate candlepower standard, the latter with a view to affording the necessary protection to those who still use the open-flame burner.

Electrical standardization in China is engaging the attention of the Engineering Association of China, having headquarters at Shanghai. It is proving a rather difficult undertaking because of the great variety of supplies now shipped into China from various parts of the world. It is recognized, however, that far-reaching benefits would result from the proposed standardization, and as a result the consuming public is encouraging the movement. The officers and directors of the Engineering Association of China are as follows: J. S. S. Cooper, chairman; R. A. Williams, secretary; T. H. U. Aldridge, H. H. Arnold, N. G. Beale, J. E. Burgess, L. Junginger, E. Kocher, L. Laforest, and S. S. Sellick. In case it is possible to bring about the desired standardization the following advantages would be secured: (1) Buyers of electrical plant will receive tenders on a comparable basis; (2) the possibility in interconnecting different systems and the consequent use of large bulk supplies, which is almost impossible in many of the larger European cities; (3) minimizing the variety of electrical stock, such as lamps, meters, motors, transformers, and general supplies, kept at the trading centers; (4) the interchangeability of consumers' appliances.

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Combination—Co-operation—Competion

These three: Combination, co-operation and competition. None is greatest. Each is necessary and has its place. First, a joining together for a common purpose, then an operating together in the extension of markets and the furthering of mutual interests and finally a continued operation stimulated by sane competition.

Combination makes for solidarity, and is conducive to efficiency. Introduces strength into craft or industry. Blends into one perfect whole and so binds with the cords of a common purpose that all interested act as a unit.

The effects which follow are the result only of co-operation. Joint operation in achievement. The power and purpose of the Jovian Order makes possible a high order of co-operation. "All-together all the time for everything electrical."

First the wide membership rapidly embracing each individual in the electrical industry, and then the accomplishment of the purpose of the organization through co-operative effort. A working together to popularize the product and so further the interests of the individual and the industry.

The existence of the two Jovian Orders is inconceivable, and equally so one nation-wide electrical dealer, jobber or contractor. Competition in the carrying out of the purpose is essential. Not cut-throat competition, but that which recognizes the necessity even there, for team work.

The idea should be, get the business by any method which squares with, but by none opposed to the principle which has called the Order into existence, namely—mutuality in the realization of a common purpose.

Combination, co-operation and competition, these three then, constitute the life of trade today.

Life is that which stimulates, and galvanizes the inert into intelligent action.

To abolish the competitive system entirely is to automatically introduce socialism.

In an ideal state in which the undesirable qualities of humans have been eliminated, socialism with its implied principle of associated and correlated effort applied to everything would indeed prove a desirable equalizer of the business load carried by each.

But the condition which confronts the people of today is a real condition with all the limitations implied; the individual apathy, indolence, inability, ignorance, rapacity and greed; the selfishness and cunning of the weak; the domination and oppression of the strong.

Socialism is an ideal state possible only in an ideal community. It may be said to be eons distant.

Such extreme co-operation would strive to share equally the benefits of invention and make monopoly an efficient means of distribution that maximum benefit be derived by all.

But invention with its efficiency and progress is impossible without incentive. Lack of incentive is inertness, and inertness, death.

Co-operation eliminating competition would prove a hastening of industrial death.

The Inertia of a Name

"What's in a name?" wrote Shakespeare and while his implied reply of "Nothing," might be applicable in that particular instance, yet a name is a word, and as such conveys all the meaning that the use of the word implies. So that if a thing is called by the wrong name the wrong impression created will continue indefinitely—all according to the physical law of inertia.

As supplementing Mr. H. S. Cooper's discussion, which appeared in a recent issue, it is of interest to note that the principles advocated by Mr. Commissioner Thelen in his paper on the determination of a scientific basis for rate-making, no longer represent the opinions of an individual but have been accepted by other members of the California Railroad Commission and used as a basis for recent decisions.

It is inconceivable that the commissioner should have intended the relationship of principal and agent to be considered as applying to all utilities and to every condition, though this is the generally accepted idea.

But whether the relationship is that of Principal and Agent, a Partnership, or some other, and while some may consider that the utility is entitled only to a return upon capital judiciously invested, agreement with this departure from generally accepted business principles which prevent a utility enjoying with other corporations a return upon the so-called unearned increment, will not form a sufficient basis upon which to establish the fundamental relationship which does exist.

It would appear that Mr. Commissioner Thelen has drawn much of his inspiration from the decision of Judge Van Fleet in the case of San Diego Water Company vs. San Diego, 118 Cal. 556, where, at page 570, the idea is expressed that the utility is only the agent of the public to administer the use of certain public properties contributed or acquired.

Much might be said for and against such an attitude as applying to all public utilities. But one fact stands out prominently. This word "agent" used by Judge Van Fleet does not mean that there is necessarily a correlated "principal." The use of the word "agent" does not therefore infer that the public is the principal but rather the "owner" of some, or apparently in that case all, of the properties used. The public might as readily be termed the silent partner and the utility the agent—the active partner.

The legal meaning of "agent" as interpreted from the old English law of "principal and agent" is not the same as the general physical meaning of the word. An "agent" may be one who acts or has power to act. This without reference to a power from which authority to act is derived.

In this way we may consider the utility as the agent; the means; "the active power or efficient cause" according to the Standard dictionary, of the service rendered to the public, and it appears equally probable that this is the sense in which the term "agent" was used by Judge Van Fleet in his much quoted San Diego decision.

"What's in a name?"

Much of discussion if it has a dual meaning and perhaps much of harm if wrongly interpreted.

But by whatever name commercial utilities may be called, there is no question but that their service has continued to improve, while at the same time government statistics offer the unquestionable proof, that no matter what their rate-making basis actually is, their charges (rates) continue consistently their revision, downward.

The Most Efficient Light

Man dominates all. Yet to the lesser lights of creation he still turns, as he has done always, for inspiration and information. This life and intelligence, though inferior to that of mankind, still holds secrets which insistently challenge investigation. They remain unanswered.

Ant activities for example, have called forth admiration since before the days of Solomon and have proved the example and incentive of the sluggard's turning toward industry.

The perseverance of the spider was both annoyance and inspiration long before a Bruce admitted the source of his renewed activities resulting in achievement, while to the bee, man must always turn for his highest lessons in co-operation and devotion to duty.

To all of these he has turned for the foundation of his most admirable feats of construction engineering though the greater accuracy of the work of the lower organisms still induces admiration and awe.

At the Panama Pacific International Exposition, 1915, the recently developed nitrogen filled lamp, with its remarkable efficiency of .6 watts per candle, will be used for special lighting effects.

But light will also be used there which will have ten times the efficiency of the latest production of the lamp factories, for throughout the restful moon-lit setting of the Palace of Fine Arts, no light will be visible save the flash of an occasional firefly among the foliage.

The fire-fly emits light at an efficiency which baffles man's duplication, being somewhere in the neighborhood of 0.054 watts per candle; practically all the energy expended being used for light production within the range of the visible spectrum.

As a constant light source the light of the fire-fly and other lower organisms would be far from satisfactory. It has been described as having been carried too far for human needs. Its color being of course undesirable as it ranges from yellow to bluish green.

Even though you destroy these little generators of such magnificent parts, and their product is still available it may years afterward, be made to produce light.

Born of an intense interest in this subject—the production of light by living organisms—Mr. F. Alex. McDermott has just given these and other fire-fly facts in a paper presented before the Illuminating Engineering Society.

Mr. McDermott states that because of his investigations he has "been accused of intending to run the electric lamp makers and illuminating gas manufacturers out of business." But though the possibilities are vast, the conclusion is that "the production of artificial fire-fly light will not interfere with present methods of illumination—at least, not for a long time to come."

PERSONALS

ITEMS FOR THIS DEPARTMENT ARE SOLICITED FROM ALL READERS

F. V. McAvoy of the Reno Electric Works, Reno, Nevada, was a recent Sacramento visitor.

H. F. Yost, representative of the Electric Appliance Company in Nevada, is at San Francisco.

P. D. Callahan, representing Faries Manufacturing Company, Decatur, Ill., is at San Francisco.

C. A. Conry, representing "The Electric Garage," Sacramento, Cal., was a San Francisco visitor last week.

R. St. John is now connected with the Edison Lamp Works of General Electric Company at San Francisco.

F. A. Walker, electric department manager of Weinstock, Lubin Company, Sacramento, was at San Francisco recently.

"**A. E. Morphy,** assistant secretary Southern California Edison Company of Los Angeles, will summer in Santa Monica."

Van E. Britton, gas engineer, announces the removal of his offices to rooms 304-307, 454 California street, San Francisco.

A. Cherrill of the firm of Rankin & Cherrill, electrical contractors and dealers, has returned to Vancouver, B. C., from Southern California.

Fred F. Skeel, sales manager, Crouse-Hinds Company, Chicago, Ill., is at San Francisco, having just completed an extended business trip throughout Southern California.

Nick Cooper, salesman with Westinghouse Electric & Manufacturing Company, has just returned to San Francisco from a business trip through the southern part of California.

C. E. Roesch has been appointed Western representative of the Edward F. Caldwell Company, high class lighting fixtures, of New York, and has opened a studio and offices in the Shreve Building, San Francisco.

James B. Brokaw, Idaho Jovian Statesman, held a rejuvenation at Pocatello, April 18th. **A. E. Smith** and **A. L. Faber** and **H. E. Holland,** of Salt Lake City, and Reigning Mars **E. A. Wilcox,** of Twin Falls, assisted.

N. C. Cotabish, general sales manager National Carbon Company, Cleveland, Ohio; **H. E. Hackenberg, secretary and** treasurer, and **F. H. Murray,** local manager of the company at Los Angeels, Cal., are at San Francisco.

Chas. T. Phillips is consulting illuminating engineer on the lighting project for the Fourth Street Improvement Association, San Francisco. It is proposed to use about ninety one-light standards equipped with nitrogen-filled lamps.

H. W. Cope, assistant manager, Industrial & Power Department, Westinghouse Electric & Manufacturing Company, Pittsburg, Pa., has arrived at San Francisco in order to make arrangements for the Westinghouse exhibit at the P. P. I. E.

Frank Cavenagh of New York has been appointed manager of the San Francisco office of the Metric Metal Works of the American Meter Company, manufacturers of the Tobey Cast Iron Gas Meters. Offices have been opened at 768 Mission street.

C. M. Brewer, manager Western States Gas & Electric Company, Richmond, Cal., has been appointed a member of the Factory Committee of the Richmond Industrial Commission which has laid plans for an aggressive campaign to locate new factories in Richmond this year.

F. H. Hughes, selling representative of the Rauch & Lang Carriage Company of Cleveland, Ohio, is in Salt Lake City, and will spend the next three or four months there working in conjunction with the Spiker Electric Garage Company, their local representatives.

Robt. Sibley has left for an extended trip to Honolulu, the ocean voyage being taken with a view to complete recovery of his health. The series of articles recently started by Mr. Sibley in this Journal cannot yet be continued. We wish him bon voyage and a speedy recovery.

W. L. Goodwin, general menager Pacific States Electric Company; **W. S. Berry,** local manager Western Electric Company, San Francisco, and **W. S. Hanbridge,** Secretary of the State of California Electrical Contractors' Association, are visiting Los Angeles on business in connection with the latter association.

John C Jones, Jovian Statesman, has planned for a rejuvenation at Salt Lake City, Tuesday, April 21st, at the close of the convention of the Utah Power and Light Company representatives. Several hustling committees are at work on the affair, and the rejuvenation promises to be one of the most highly successful ones held in the city.

Dr. Thos, Addison, Pacific Coast manager General Electric Company, presided at a conference of local managers of the company held at Del Monte during the past week. **T. E. Bibbins,** local manager, San Francisco; **J. A. Cranston,** local manager, Portland, Oregon; **R. J. Cash,** of Los Angeles, Cal.; **S. E. Kearny,** Pacific Coast auditor, and **W. J. Davis,** Pacific Coast engineer, were in attendance.

Alexander Dow, formerly president of the Detroit Edison Company, who has been in the West for some time doing some consulting work in connection with an irrigation system in Arizona, was in Los Angeles last week and while there addressed the Realty Board on "Municipal Ownership." He pointed out its many pitfalls and sounded a warning to the citizens of Los Angeles, who are now contemplating the building and operation of a municipal power plant.

R. Roy Cowles was elected an Associate Member American Institute of Electrical Engineers at the directors' meeting held at New York, March 13, 1914. Others elected associates at that time and residents in the West, were: **Arthur H. Demock,** city engineer city hall, Seattle, Wash.; **Frank H. Klippel,** meter tester, Nevada-California Power Company, Tonopah, Nev.; **Russell B. Munroe,** electrician, Phoenix Construction Company, Provo, Utah; **W. L. Newton,** Throop College of Technology, Pasadena, Cal., and **Claude R. Shaw,** of the Northern California Power Company, Manton, Cal.

R. H. Sperling, who was general manager of the British Columbia Electric Railway Company, Ltd., operating on Vancouver Island and the mainland of British Columbia, has been promoted to the position of assistant executive to the chairman of the board of directors at the London offices of the company. Mr. Sperling, though a very young man, has successfully piloted the company through its most trying period of expansion, notwithstanding all the deterrent political influences involved. He has always been prominent in educational and welfare work in the interests of employes and it is noteworthy that throughout his administration there has been no cessation of the company's service due to labor troubles. Rather the policy of the management acted as a stabilizer to the labor situation in the territory served.

Chas. H. Lee has been appointed by the Treasury Department as consulting engineer to advise with the United States Public Health Service regarding a water supply at the large tubercular sanatorium maintained by the government at Fort Stanton, New Mexico. The sanatorium has in the past diverted water from Rio Bonito for domestic and irrigation purposes, and is now involved with other water users in an adjudication of water rights as provided for under the state water laws. The adjudication has been initiated as a result of the diversion of water from the drainage area by the El Paso & Southwestern Railroad for locomotive and train use. The railroad has spent over a million and a half of dollars in developing and transmitting mountain water along its line, and in so doing has seriously affected the sanatorium supply. Mr. Lee has just returned from a three weeks' trip to Fort Stanton and on the way back stopped several days in Denver and attended the irrigation conference called by Secretary Lane.

MEETING NOTICES.

San Francisco Electrical Development and Jovian League.

The league met at a downtown cafe last Tuesday and after luncheon enjoyed a series of moving pictures shown by E. H. Kemp, of the Gamboa Dyke operations on the Panama Canal and of the Grand Canyon of Arizona. Mr. Kemp made many interesting comments on the pictures. W. F. Neiman, president of the league occupied the chair.

Seattle Section A. I. E. E.

The April meeting of the Seattle Section was held in the assembly room of the Chamber of Commerce on the top floor of the Central Building, on Tuesday evening, April 21st. Robert Howes presented a paper entitled "Engineering Ethics," which was followed by several prepared discussions of the above paper, together with a consideration of the more general topic, "The Relation of the Engineer to the Civic and Social Problems of the Day." Important matters of business also came before the Section at this meeting, which was well attended.

Illuminating Engineering Society.

The executive council at a recent meeting held at New York expressed an opinion to the effect that they at that time deemed it inexpedient to hold the 1915 Convention in San Francisco. With the rapidly growing interest in this Society here, there should be no reason why this opinion should not be reversed in the minds of the members of the incoming administration. The statement of the present council which has been spread upon the minutes of the I. E. S., should stimulate Pacific Coast members both in their quest for new members and in the formation of one or more Pacific Coast Sections.

Utah Society of Engineers.

The annual banquet and meeting of the Utah Society of Engineers was held at the Hotel Utah Friday evening, April 17th. Ledyard M. Bailey was toastmaster and addresses were made by A. S. Peters, chief engineer of the Mountain States Telephone and Telegraph Company, retiring president; W. W. Armstrong, president of the National Copper Bank; W. J. Barrett, president of the School Board; and John C. Howard, president of the Utah Oil Refining Company.

Following the banquet, the annual election of officers was held. Sylvester Q. Cannon, city engineer, Salt Lake City, was elected president. The other officers chosen were: Samuel S. Arentz, chief engineer of the Interurban Construction Company, vice-president; Frank W. Moore, architect, secretary; L. H. Jones, city engineer's staff, treasurer.

Electrical Section Nevada Industrial Safety Association.

The program of the meeting of Electrical Section, Nevada Industrial Safety Association, held at the Electrical Building, University of Nevada, at 2 p. m. on April 18th, was as follows:

1—Proper Voltage for Underground Mine Operations. F. B. Mechling, manager Nevada-California Power Company.
2—Methods and Safety in Underground Electric Haulage. R. E. Middagh, electrical engineer, Steptoe Valley Smelting & Mining Company.
3—Possibilities in Underground Single-Phase Traction. T. R. Landsborough, chief electrician, Tonopah Extension Mining Company.
4—Handling Storage Battery Locomotives Underground. F. O. Broili, electrical engineer, Elko-Lamoille Power Company.
5—Lightning Protection for Mine Installations. H. D. Brown, superintendent, Truckee River General Electric Company.
6—Commercial Features in Safeguarding Electric Mine Installations. G. B. Burnham, General Electric Company.
7.—Handling High Voltages, Underground. G. L. Perrin, chief electrician, Nevada Hills Mining Company.
8—Operation of Electric Shovels. Joseph Beane, electrical superintendent U. S. R. S. Truckee-Carson Project.

These papers will be printed in full in an early issue of the Journal.

Utah Electric Club.

At the regular weekly luncheon of the Utah Electric Club held at the Commercial Club Thursday, April 16th, Judge C. S. Varian, a prominent attorney of Salt Lake City, read an able paper prepared by him especially for the club on the Panama Canal Tolls Question. Judge Varian traced the history of negotiations from the time that an isthmian canal was first considered down to the present day. He quoted copiously from Presidential messages, state department papers and treaties, which indicated clearly that it had been the intention of the United States Government long before they themselves considered the proposition of building a canal to so arrange matters that by whomever the canal was built that it should be maintained and operated in an entirely neutral manner and that it should be open to the ships of all nations, the United States not excepted, for the purpose of commerce and navigation under substantially the same conditions as the open sea. He maintained very strongly that both by treaty and my moral obligations, the United States should not exempt clear coastwise vessels from tolls.

Jovian Electrical League of Southern California.

A very timely and helpful talk on "City Planning" was given before the League at the weekly luncheon held at Christopher's, Los Angeles, on April 15th, by J. S. Lathrope, the well-known city planning expert of New York City, in charge of the city planning exhibition now being shown in the city of Los Angeles. Mr. Lathrope is a serious and practical worker and is strongly advocating the establishment of a city planning commission in Los Angeles.

The meeting was attended by nearly 100 Jovians and a splendid whistling exhibition was given by Miss Stafford. Many visitors were introduced and it was announced by Chairman Colkitt that a rejuvenation will take place about the middle of May. Prizes, in the form of Jovian jewelry, will be given to the members securing the largest number of candidates. The meeting was presided over by A. G. Drake.

About 350 Jovians and their friends attended a very enjoyable theater party at the Orpheum on the evening of April 16th and their appreciation of the charms of Fritzi Scheff was attested by the presentation of a large bouquet of American Beauties to "the little devil of the opera."

NEWS OF THE CALIFORNIA RAILROAD COMMISSION.

The commission has rendered a decision in which it finds that the agreement entered into July 13, 1912, between the Northern Electric Railway Company and the Sacramento & Woodland Railroad Company, by the terms of which the Northern Electric Company was granted the right to operate the Sacramento & Woodland line over the right of way of the Sacramento & Woodland and the Vallejo & Northern Railroad Companies between Sacramento and the city of Woodland, is void, because not authorized by the commission.

The commission has rendered a decision in which it denies the application of the Sawtelle Water Company, operating at Sawtelle, Los Angeles county, to issue $25,000 in 5 per cent thirty years bonds. As an alternative the commission grants authority to the company to issue notes in the sum of $10,500 for the purpose of making additions and betterments to its plant and system in the territory contiguous to the city of Sawtelle.

The commission has rendered a decision granting authority to the Pacific Telephone & Telegraph Company to surrender its franchise in Oakland and to take over and operate under the franchise of the Bay Cities Telephone Company, which the Pacific Telephone & Telegraph Company purchased in 1912.

The commission has rendered a decision authorizing the Los Angeles & San Diego Beach Railway to issue refunding promissory notes in the sum of $15,000 bearing interest at the rate of 6 per cent and a second promissory note in the sum of $19,000, bearing interest at the rate of 4 per cent, both due in four months. The notes are to be sold at their face value.

INTERNATIONAL ENGINEERING CONGRESS, 1915.

The attention of the engineers of the world is being more and more drawn to the program of the International Engineering Congress which is to be held in San Francisco, California, in 1915. The interest which has been aroused in foreign countries is shown by the fact that at the present time there have been received enrollments and subscriptions from 42 such countries. Of the present total enrollment, approximately 25 per cent is from the countries other than the United States. The number of subscriptions from the members of the five national engineering societies of the United States under whose auspices and control the Congress is being held is, however, not so gratifying. The percentage of the total membership of these five societies represented by the subscription list is only 3.7, and this, although each individual member of these societies has received circular information and data concerning the Congress and has been urged to send in his subscription promptly. This, to a considerable degree, handicaps the work of the Committee on Management, and it is extremely desirable that as many as possible who intend to subscribe should do so at an early date.

The list of topics to be treated in the Section on Mechanical Engineering gives a very good idea of the character of the publications which it is intended to issue and the topics which will be presented and discussed at the meeting. These are as follows:

Recent progress and present status of foundry practice, and casting metals; recent progress and present status of the art of forging; equipment processes, and methods for the boiler-shop; machine-shop equipment, methods, and processes; automatics; special processes for shaping and forming metals; high temperature flames in metal-working; industrial management; safety engineering; industrial museums as an educational factor; the steam-engine of the year 1915; the steam-turbine of the year 1915; the internal-combustion engine of the year 1915; motors of the Diesel type; the Humphreys gas pump; the steam boiler of the year 1915; refrigeration; pneumatics; lubrication and lubricants; water wheels of pressure type; water wheels of impulse type; hydraulic power developments and use; power-plant design; motor vehicles, passenger type; motor vehicles, utility type; motor tractors.

Many of these topics will be treated as symposiums with contributions representing the practice in more than one country.

The various sections outlined for the work of the Congress and the volumes to be issued are as follows:

Vol. I.	The Panama Canal
Vol. II.	Waterways and Irrigation.
Vol. III.	Municipal Engineering.
Vol. IV.	Railways and Railway Engineering.
Vol. V.	Materials of Engineering Construction.
Vol. VI.	Mechanical Engineering.
Vol. VII.	Electrical and Mechanical Engineering.
Vol. VIII.	Mining Engineering and Metallurgy.
Vol. IX.	Naval Architecture and Marine Engineering.
Vol. X.	Military Engineering, and Miscellaneous.

The proceedings of the Section on Mechanical Engineering will be published in Vol. VI, with some of the papers falling into Vol. VII. It is also noted that Vol. X will consist only in part of Military Engineering and will also contain papers on miscellaneous topics which are not definitely associated with any of the various sections.

Full information concerning the Congress may be obtained by addressing the Committee of Management at the Foxcroft Building, San Francisco.

PEDDLERS WIN BALL GAME.

What might be termed an errorless game was witnessed by an enthusiastic crowd of fans electrical (don't put the reverse English on this) at the Ocean Shore grounds, San Francisco, last Saturday, when the Peddlers beat the Pawnbrokers by a score of 7-4. This was the first game of a series, the rest of which you should see. The line-up was as follows:

Peddlers.		Pawnbrokers.
Dunbar	Pitcher	Purcell
McGovern	Catcher	Carew
Pennoyer	1st Base	Hunt-Rose
Hammer-Fotreau	2d Base	Murphy
Valleau	3d Base	Vallejo
Vogalsang	Right Field	Williams
McCann	Center Field	Sullivan
Hauck	Left Field	Mahoney-Daxy
Francisco	Short Stop	Swan

NEW CATALOGUES.

The 1914 Hubbard Reference Book on pole line construction is being distributed from the Pacific Coast office of Hubbard & Company at 693 Mission street, San Francisco. This text illustrates and describes various methods of line construction giving many practical suggestions and new ideas on the subject.

TRADE NOTES.

The Haliday Machinery Company recently furnished the city of Seattle with a Ridgeway motor generator of 500 kw. capacity, at a cost of $7310.

Westinghouse Electric & Manufacturing Company recently sold one 2500 k.v.a. water wheel type generator to the Truckee River General Electric Company.

On account of the rapidly approaching completion of the Big Creek project the Fresno, Cal., office of the Stone & Webster Construction Company will be closed May 1st.

The Puget Sound Flour Mills of Tacoma has recently contracted with the Puget Sound Traction, Light & Power Company of Seattle for current to the extent of 800 h.p.

The Electric Appliance Company secured the order for lighting fixtures and Nubolux reflectors for the new office building of the United Verde Copper Company, Jerome, Ariz.

The Board of Public Works of Seattle recently placed orders for 6000 watt-hour meters. The order was divided between the Western Electric Company, the Fort Wayne Electric Company and the Northwestern Supply Company, at Seattle, Wash.

To illustrate the rapidity with which lodgepole pine is being recognized as a pole timber, the District Forester, San Francisco, states that a contract is now in effect whereby a large area of lodgepole pine on the Lassen National Forest is being sold to a company of local men. It is understood that this company will erect one or more creosoting plants and will place butt-treated poles on the market during the coming season.

The Utah Power and Light Company are calling a convention of all of their district and commercial representatives to be held in Salt Lake City April 20th and 21st. Regular matter pertaining to the company's business will be taken up and discussed during the four sessions of the conference. On Monday evening a banquet will be given by the company to its visiting representatives and some invited guests. Tuesday evening will be given over to the Jovian Rejuvenation, for which Statesman John C. Jones has arranged.

S. S. Bullis of New York City is promoter of the street car lines at Medford, Oregon, and is also doing extensive work at the Sterling mine located 14 miles south of Medford in the Siskiyou mountains. The 6600 volt a.c. generator brought from Jacksonville last fall has been installed three miles above the mine, where a 75 ft. head is available, and is direct connected to a Pelton turbine. The three-phase transmission line is No. 2 bare copper, three miles long, supplying power to a 300 h.p. motor direct connected to a centrifugal pump which will increase the water pressure to be used in the placer mining operations. The generator is an 850 k.v.a. Bullock machine. The motor generator set at Medford for the street car work consists of a 290 h.p. Westinghouse, three-phase, 2200 volt, synchronous motor, connected direct, to a Westinghouse, 200 kw., 600 volt d.c. generator, running at 900 r.p.m. The switchboard is of Westinghouse manufacture, two panels, one containing the a.c. ammeter, power-factor meter, exciter ammeter and switch lever for the 2200 volt oil switch controlling the motor. The other panel contains the d.c. line switch, voltmeter and ammeter, etc. They are operating one car from Main and Central avenue, to Siskiyou Heights. It is a St. Louis Car Company car, pay as you enter type, seating 32 passengers. It is equipped with two, 80 h.p. General Electric motors.

NEWS NOTES

FINANCIAL.

NORTH YAKIMA, WASH.—The Washington Public Service Commission recently placed the valuation of the gas plant of the Pacific Power & Light Company here at $201,748, although the cost of production is given at $234,093.

SPOKANE, WASH.—Deeds transferring lands valued at $142,500 to the Spokane Valley Power Company have been filed. J. D. Sherwood is president of the company which is capitalized at $200,000. Announcement is made that a meeting has been called for the purpose of increasing the capital to $2,000,000 to furnish bonds for developing a power site which will furnish 20,000 h.p. A dam is to be built which will give 40 miles of back water on the Spokane River.

INCORPORATIONS.

ALAMAGORDO, N. M.—The Alamogordo Light & Power Company has filed articles of incorporation. The capital stock of the company is $25,000, the incorporators being Col. W. R. Edison, Guy T. Watt and Z. D. Ross. This is a reorganization of the old Alamagordo Water Power Company.

WALLA WALLA, WASH.—Articles of incorporation of the Walla Walla River Power Company have been filed and the promoters of the enterprise, who are Walla Walla and Milton capitalists, are now engaged in securing deeds and easements for rights of way on the river preparatory to starting construction of an electric power plant. The company is capitalized at $120,000, and it is estimated that the plant with a working capacity of 1800 h.p. will not cost to exceed that amount.

ILLUMINATION.

SAN BERNARDINO, CAL.—The city trustees have granted a franchise to the Rialto Light, Power & Water Company.

NEWPORT, CAL.—The board of trustees of this city will receive bids up to April 27th for the construction of a street lighting system.

DRAIN, ORE.—An ordinance has been passed authorizing the council of the city of Drain to construct an electric light plant, and for the issuance of bonds in the sum of $15,000 to pay for the same.

ORANGE, CAL.—The Long Beach Consolidated Gas Company has been granted a franchise to operate a gas distributing system along certain public highways in or near Bay City, in Orange county.

LOS ANGELES, CAL.—The board of supervisors of Los Angeles county will receive bids up to May 11th for installing and maintaining an addition to the street lighting system in the Van Nuys lighting district.

SEATTLE, WASH.—Construction work will be started immediately on the auxiliary steam power plant to be erected on the east shore of Lake Union by the city lighting department. The building will be of concrete construction, and cost $50,000.

JEROME, ARIZ.—An election will be held here May 25th for the purpose of submitting to qualified voters the question as to whether franchises shall be granted to the Upper Verde Public Utilities Company giving right to construct and operate an electric lighting and power system, heating and cold storage system, telephone-telegraph system, gas plant, and gas system, water system and sewer system.

LOS ANGELES, CAL.—The board of supervisors during the past week took up the last extension ordinance for the lighting of Sherman way and the state hightway through the San Fernando Valley. The new extension adds 13 miles of lighted way to the 32 miles now in operation. When fully complete the Sherman way and the state highway will have 178 five-lamp electroliers, 541 three-lamp electroliers, 60 one-lamp electroliers and 60 gooseneck lamps.

HOLLYWOOD, CAL.—An electrical fountain will be one of the features of the arts and crafts festival with which club women of Hollywood expect to raise funds for the erection of their new clubhouse. The festival is to begin April 27 and last one week. It will be held at the Toberman building, Hollywood boulevard and Highland avenue, under the auspices of the Woman's Club of Hollywood. Arrangements were completed for the arts and crafts electrical fountain, which will be an extraordinary innovation. It will decorate the center of the hall.

RIVERSIDE, CAL.—The bid of the City Electric Supply Company, at $3862.61, for the installation of an ornamental lighting system on Tenth street caused surprise as the city's bid was $4200. The accepted bid is 15 per cent under the assessment collected, which amounts to $4568.82. Other bids were submitted as follows: H. P. Bennet, Los Angeles, $4301; Woodill & Hulse Electric Company, Los Angeles, $4327; D. Coldren, Riverside, $4228.75. The type of post used in work of this character is reinforced concrete. Including other classes of lighting, the city now has fifty miles of lighted streets.

TRANSMISSION.

BAKER CITY, ORE.—The South Baker power plant of the Eastern Oregon Light & Power Company was totally destroyed by fire recently. The loss is estimated at $75,000.

SAN BERNARDINO, CAL.—The Southern California Edison Company has applied for a pole line franchise on a number of county roads. The franchise has been ordered advertised for sale May 11th.

SEATTLE, WASH.—A franchise for pole lines, transmitting electricity for light and power over North District county roads, have been granted to the city of Seattle and the Puget Sound Traction, Light & Power Company.

LOMPOC, CAL.—The Midland Counties Gas & Electric Company is contemplating purchasing the Lompoc power plant and extending its high power line here. From here it will probably be extended to Selvang or Santa Ynez to furnish power for irrigation purposes.

OPPORTUNITY, WASH—A power line to furnish additional electric current on the Opportunity-Vera line of the Spokane & Inland Empire Railroad Company is being constructed. The new feeder installation will cost about $4500 and will improve light and power conditions on the line.

GOLDHILL, ORE.—Officials of the Rogue River Public Service Corporation were in Grants Pass recently visiting the company's power site. Geo. E. Sanders, president of the corporation, and Robert E. Gaut, constructing engineer, were in the party. A rumor is afloat that the 5000 h.p. project at Goldhill will be actively under way as soon as the fall of the river permits. Plans call for the expenditure of $500,000. It is probable that the company will interest itself in an irrigation project for the district between this city and Grants Pass, turning the water into the main ditch at this point.

FALL RIVER MILLS, CAL.—The California Power & Manufacturing Company, which obtained a franchise three months ago to operate a power plant and sell electricity in Northeastern Shasta county, has begun operations in earnest. A pole line is being rushed to Glenburn, where much of the power will be consumed for purposes of irrigation. Several representatives of the company have been in Fall River Mills recently, and Leo Haas of San Francisco is sta-

tioned here as general agent and is preparing to open offices here. At present Fall River Mills is the only town in Northeastern Shasta county which has electricity for lighting or other purposes. The present power plant owned by Florin Bros. and upon which the C. P. & M. Company holds an option, is to be enlarged and power derived from the waters of Fall River, as at present. The falls of Hat Creek at Cassel, will also be utilized by the company later for the generation of electricity.

BOISE, IDAHO.—Judge Frank S. Dietrich of the Federal Court has just issued an order permitting the receiver of the Idaho-Oregon Light and Power Company to issue receivers' certificates up to $250,000, to be used in the completion of the Oxbow power plant, located on the Snake River, between Idaho and Oregon. The application of the receiver for his authority was made some time ago, and the stockholders of the company divided on defending and opposing it. The risk to the issuance of the certificates is to be attached to those stockholders who backed up the receiver in his application. They are said to have made arrangements for the disposal of their certificates, thereby raising the money to finish the work on the plant. When the Oxbow tunnel plant was started some years ago by the Idaho-Oregon Company, its backers then had no idea that it would cost the amount of money that it has. The drilling of a tunnel through a mountain of rock and other difficulties that were unforeseen at the time the work was started, took all of the original estimate and additional funds failed to complete the work. The plant is one of the most important to the development of electrical energy in Southern Idaho. It represents a difficult piece of engineering. When the power war broke out among the various big power corporations in the Southern Idaho field, and the stockholders of the various interests began to quarrel, work on the Oxbow plant was abandoned, and since then up to the present time there has been little done. Now the Idaho-Oregon needs the electricity from a large generating plant. A receiver having been appointed for that company to handle its affairs pending the outcome of the litigation that involves it and instituted in the federal court, proposes to supply this energy by going ahead with the completion of the plant and nas secured the approval of the court.

TRANSPORTATION.

MIAMI, ARIZ.—The Globe & Miami Traction Company has peitioned the board of supervisors of Gila county, for a right-of-way along the county highway upon the route reserved by the Miami Copper Company for railroad purposes, for construction of an electric railroad in and between the towns of Globe and Miami.

BOISE, IDAHO.—A move is on foot to build an electric road from Twin Falls to the Albee place at Rock Creek, a distance of 17 miles. C. V. Parks or Twin Falls was in the Kimberly district recently soliciting subscriptions and asking the farmers for a right of way. It is hoped to raise $50,000 by subscription, and with this sum the grading of the road can be done.

MODESTO, CAL.—That the Tidewater & Southern Railroad is contemplating the placing of its Modesto depot and other shipping facilities in this city on N street, between Tenth and Eleventh, is indicated by the persistent talk on the streets of negotiations that have been taking place between property owners and railroad representatives recently for the purchase of lots in this vicinity.

SAN JOSE, CAL.—The new owners of the San Jose Terminal Railway, who state that they propose to run an electric line from Almaden, through this city, on to Alviso, there from that town to Port San Jose and out to deep water, there to connect with a line of steamers to San Francisco were granted this week by the mayor and common council the franchises they desired for constructing and operating their proposed line within the municipal limits. The company owns a private right of way from San Jose southerly to Almaden and northerly to deep water in San Francisco Bay, and under the terms of the franchise the portion of the road within this city must be completed by the first of next January. The road has the backing of a syndicate composed of Lee H Landis, president of the Tidewater & Southern Railroad, between Stockton and Fresno; Eric Lindbloom, W. W. Jones, Charles A. Warren and John J. Mahoney, all of San Francisco, and others.

TELEPHONE AND TELEGRAPH.

CLAYTON, N. M.—The trustees of this city have granted a telephone franchise to Frank H. Clark.

WOODLAND, CAL.—The city attorney has been instructed to prepare an ordinance granting a franchise to the Pacific Telephone & Telegraph Company.

SPOKANE, WASH.—To facilitate the settlement of the telephone situation in Spokane, Chas. R. Hopkins, special representative of the Pacific Telephone & Telegraph Company will apply for a franchise.

NAPA, CAL.—R. W. Miner, local manager of the Pacific Telephone & Telegraph Company, has received word from headquarters that the sum of $3100 is to be expended by the company in improvements to its system in this city

TUCSON, ARIZ.—Extensive alterations and improvements representing an expenditure of $25,000 will be made by the Mountain States Telephone Company through North Arizona within the next few months. An entire new plant will be installed at Flagstaff and extensive alterations made at the Williams office. Four miles of new line will be built.

WATERWORKS.

LOS ANGELES, CAL.—The public service commission has favored the proposal to furnish water to the San Fernando valley section this summer, without waiting for the formalities of bringing the district into the city.

TOWNSEND, WASH.—Acting on City Engineer Saddler's report relative to the Snow creek water supply, the council has ordered him to file for the city a water right on a stream about two miles from Snow Creek. The cost of extension was roughly estimated at $7000.

SAN FRANCISCO, CAL.—Private individuals who have complaint against the Spring Valley will not be permitted to associate themselves with the city of San Francisco as joint plaintiffs in the rate suit filed by the city, according to a decision handed down by Judge Van Fleet. A number of these private complainants joined forces recently and employed an attorney with the expectation of appearing as complainants with the city in the last rate suit. Application for the right to do this was filed and the adverse decision was given. Judge Van Fleet said in his decision that the city and county of San Francisco was the only legitimate representative of the consumers and he would not allow any other plaintiffs to join in the suit at this late date.

OAKLAND, CAL.—Frank C. Havens must sign an ironclad option for the selling of the People's Water Company, framed on the terms he offered at the mayor's conference Thursday, according to a statement issued from the mayor's office. It is announced also that Assistant City Attorney C. A. Beardsley will be appointed as Oakland's representative at a conference to be held with the legal staff of the water company, when the option will be prepared. The work of preparing the option is expected to be done in a week. Mayor Mott has sent word to Havens that the communities, in calling the water district election, had lived up to their part of the proposed agreement for keeping the Havens option on the water property and that as an escrew of good faith, at least two-thirds of the capital stock of the water company should be deposited in the Oakland Bank of Savings.